

=> d his full

(FILE 'HOME' ENTERED AT 16:54:44 ON 25 FEB 2010)

FILE 'HCAPLUS' ENTERED AT 16:55:03 ON 25 FEB 2010

L1 1 SEA SPE=ON ABB=ON PLU=ON US20070117984/PN  
D L1 ALL

FILE 'WPIX' ENTERED AT 16:58:29 ON 25 FEB 2010

L2 1 SEA SPE=ON ABB=ON PLU=ON US20070117984/PN  
D L2 FULL

FILE 'REGISTRY' ENTERED AT 16:59:59 ON 25 FEB 2010

L3 QUE SPE=ON ABB=ON PLU=ON V/ELS  
L4 QUE SPE=ON ABB=ON PLU=ON P/ELS  
L5 QUE SPE=ON ABB=ON PLU=ON N/ELS  
L6 QUE SPE=ON ABB=ON PLU=ON O/ELS  
L7 2114 SEA SPE=ON ABB=ON PLU=ON L3 AND L4 AND L5 AND L6  
L8 QUE SPE=ON ABB=ON PLU=ON (CR OR MO OR W OR FE OR RU  
OR CO OR RH OR IR OR NI OR PD OR PT OR ZN OR NB)/ELS  
L9 698 SEA SPE=ON ABB=ON PLU=ON L7 (L) L8

FILE 'HCAPLUS' ENTERED AT 17:03:45 ON 25 FEB 2010

L10 380 SEA SPE=ON ABB=ON PLU=ON L9

FILE 'ZCAPLUS' ENTERED AT 17:03:58 ON 25 FEB 2010

L11 QUE SPE=ON ABB=ON PLU=ON CAT# OR CATAL?

FILE 'HCAPLUS' ENTERED AT 17:06:01 ON 25 FEB 2010

L12 158 SEA SPE=ON ABB=ON PLU=ON L10 AND L11

FILE 'ZCAPLUS' ENTERED AT 17:07:46 ON 25 FEB 2010

L13 QUE SPE=ON ABB=ON PLU=ON SiO2 OR Al2O3 OR ZrO2 OR  
TiO2  
L14 QUE SPE=ON ABB=ON PLU=ON ?OXIDE?  
L15 QUE SPE=ON ABB=ON PLU=ON (SI OR SILICON OR ALUMINUM  
OR ALUMINIUM OR TITANIUM OR ZIRCONIUM)  
L16 QUE SPE=ON ABB=ON PLU=ON L15 (3W) L14  
L17 QUE SPE=ON ABB=ON PLU=ON ALUMINA OR SILICA OR  
ZIRCONIA OR TITANIA  
L18 QUE SPE=ON ABB=ON PLU=ON SUPPORT#  
L19 QUE SPE=ON ABB=ON PLU=ON (L13 OR L16 OR L17) (4A)  
(L18)

FILE 'HCAPLUS' ENTERED AT 17:11:18 ON 25 FEB 2010  
 L20 41020 SEA SPE=ON ABB=ON PLU=ON (L13 OR L16 OR L17) (4A)  
 (L18)  
 D L20 1-5 KWIC  
 L21 7 SEA SPE=ON ABB=ON PLU=ON L12 AND L20  
 D L21 1-7 KWIC  
 SEL L1 RN

FILE 'REGISTRY' ENTERED AT 17:13:38 ON 25 FEB 2010  
 L22 16 SEA SPE=ON ABB=ON PLU=ON (108-99-6/BI OR 100-54-9/BI  
 OR 58834-75-6/BI OR 7439-88-5/BI OR 7439-89-6/BI OR  
 7439-98-7/BI OR 7440-02-0/BI OR 7440-03-1/BI OR 7440-05-3  
 /BI OR 7440-06-4/BI OR 7440-16-6/BI OR 7440-18-8/BI OR  
 7440-33-7/BI OR 7440-47-3/BI OR 7440-48-4/BI OR 7440-66-6  
 /BI)  
 D SCA

FILE 'HCAPLUS' ENTERED AT 17:19:41 ON 25 FEB 2010  
 L23 1069 SEA SPE=ON ABB=ON PLU=ON L7  
 L24 196 SEA SPE=ON ABB=ON PLU=ON L23 (L) L11  
 L25 12 SEA SPE=ON ABB=ON PLU=ON L24 AND L19  
 L26 5 SEA SPE=ON ABB=ON PLU=ON L25 NOT L21

FILE 'ZCAPLUS' ENTERED AT 17:20:56 ON 25 FEB 2010  
 L27 QUE SPE=ON ABB=ON PLU=ON VPO  
 L28 QUE SPE=ON ABB=ON PLU=ON VANADIUM# (2W) PHOSPHATE#  
 L29 QUE SPE=ON ABB=ON PLU=ON (L27 OR L28) AND L11

FILE 'HCAPLUS' ENTERED AT 17:22:04 ON 25 FEB 2010  
 L30 1011 SEA SPE=ON ABB=ON PLU=ON (L27 OR L28) AND L11  
 D L30 10-20 KWIC

FILE 'REGISTRY' ENTERED AT 17:23:23 ON 25 FEB 2010  
 L31 1 SEA SPE=ON ABB=ON PLU=ON 108-99-6

FILE 'HCAPLUS' ENTERED AT 17:23:40 ON 25 FEB 2010  
 L32 5602 SEA SPE=ON ABB=ON PLU=ON L31  
 L33 3179 SEA SPE=ON ABB=ON PLU=ON "3-METHYLPRIDINE" OR  
 "3-PICOLINE"  
 L34 6813 SEA SPE=ON ABB=ON PLU=ON L32 OR L33  
 L35 20 SEA SPE=ON ABB=ON PLU=ON L30 AND L34  
 D L35 1-5 KWIC  
 L36 20 SEA SPE=ON ABB=ON PLU=ON L35 NOT (L21 OR L26)

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L37      42 SEA SPE=ON  ABB=ON  PLU=ON  L30 AND L19
          D L37 6-9 KWIC
L38      39 SEA SPE=ON  ABB=ON  PLU=ON  L37 NOT (L36 OR L21 OR L26)
L39      23 SEA SPE=ON  ABB=ON  PLU=ON  L38 AND PY<=2004 NOT P/DT
L40      9 SEA SPE=ON  ABB=ON  PLU=ON  L38 AND (PD<=20040730 OR
          PRD<=20040730 OR AD<=20040730) AND P/DT
L41      32 SEA SPE=ON  ABB=ON  PLU=ON  L39 OR L40
          D L41 KWIC
L42      12 SEA SPE=ON  ABB=ON  PLU=ON  L36 AND PY<=2004 NOT P/DT
L43      8 SEA SPE=ON  ABB=ON  PLU=ON  L36 AND (PD<=20040730 OR
          PRD<=20040730 OR AD<=20040730) AND P/DT
L44      20 SEA SPE=ON  ABB=ON  PLU=ON  L42 OR L43
L45      2 SEA SPE=ON  ABB=ON  PLU=ON  L21 AND PY<=2004 NOT P/DT
L46      2 SEA SPE=ON  ABB=ON  PLU=ON  L21 AND (PD<=20040730 OR
          PRD<=20040730 OR AD<=20040730) AND P/DT
L47      4 SEA SPE=ON  ABB=ON  PLU=ON  L45 OR L46
L48      0 SEA SPE=ON  ABB=ON  PLU=ON  L26 AND PY<=2004 NOT P/DT
L49      4 SEA SPE=ON  ABB=ON  PLU=ON  L26 AND (PD<=20040730 OR
          PRD<=20040730 OR AD<=20040730) AND P/DT

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FILE HOME

FILE HCAPLUS

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FILE COVERS 1907 - 25 Feb 2010 VOL 152 ISS 9

FILE LAST UPDATED: 24 Feb 2010 (20100224/ED)

REVISED CLASS FIELDS (/NCL) LAST RELOADED: Dec 2009

USPTO MANUAL OF CLASSIFICATIONS THESAURUS ISSUE DATE: Dec 2009

HCAplus now includes complete International Patent Classification (IPC) reclassification data for the third quarter of 2009.

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FILE WPIX

FILE LAST UPDATED: 22 FEB 2010 <20100222/UP>  
MOST RECENT UPDATE: 201013 <201013/DW>  
DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE  
>>> Now containing more than 1.5 million chemical structures in DCR

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STN USER DOCUMENTATION, PLEASE VISIT:  
[http://www.stn-international.com/stn\\_dwpi.html](http://www.stn-international.com/stn_dwpi.html) <<<

>>> HELP for European Patent Classifications see HELP ECLA, HELP ICO

>>> Japanese FI-TERM thesaurus in field /FCL added <<<

FILE REGISTRY

Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

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DICTIONARY FILE UPDATES: 24 FEB 2010 HIGHEST RN 1207319-45-6

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FILE ZCAPLUS

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FILE COVERS 1907 - 25 Feb 2010 VOL 152 ISS 9  
 FILE LAST UPDATED: 24 Feb 2010 (20100224/ED)  
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This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d 141 1-32 bib abs ind

L41 ANSWER 1 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2004:832556 HCAPLUS Full-text  
 DN 142:447426  
 TI Structured metal **catalysts** - a way to intensify chemical processes  
 AU Kolodziej, Andrzej; Lojewska, Joanna; Krajewski, Waldemar  
 CS Inst. Inz. Chem., PAN, Gliwice, 44-100, Pol.  
 SO Inżynieria Chemiczna i Procesowa (2004), 25(3/2), 1121-1126  
 CODEN: ICPRDT; ISSN: 0208-6425  
 PB Oficyna Wydawnicza Politechniki Wrocławskiej  
 DT Journal  
 LA Polish  
 AB Structured **catalytic** packings are useful for intensification of mass and heat transfer during **catalytic** processes of full or selective oxidation. Methods of **catalyst** deposition on structured metal surfaces are described, and their activity in various oxidation processes are shown. In the first example a vanadium-phosphorus oxide (VPO) **catalyst** was deposited on leaf Cr-Al steel carrier. This **catalyst** was tested for selective oxidation of n-butane to maleic

anhydride, giving rise to a 70% increase in yield, in comparison with the dumped VPO catalyst. Calcns. based on the model developed for the reaction the value of activation energy 87 kJ/mol was obtained, close to literature data. The process of catalytic combustion of CO and organic compds. carried out in ceramic monoliths face the problem of low mass transport, therefore structure of a heap of fine wire gauze was proposed as catalytic carrier. A comparison of the heat transfer coefficient calculated theor. for monoliths and gauzes confirms that in short channels (gauze eyelets) the velocity profiles cannot fully develop, which brings about a significant increase in transport coeffs. A real challenge for the application of fine gauze structures is the catalyst deposition. The Langmuir film deposition method was applied to transfer monomol. layers from water surface onto the metal carrier surface to deposit washcoat and cobalt catalyst on the surfaces of Cr-Al and Cr-Ni steels. Prior to the transfer the samples were oxidized at 1000°. The metalloorg. compds. of Al and Co were deposited and the catalysts were calcined. The sample surfaces were monitored by SEM and XPS methods at various stages of preparation. The results show high metal distribution on the surface.

- CC 35-2 (Chemistry of Synthetic High Polymers)
- Section cross-reference(s): 27, 45, 67
- ST structured metal catalyst prepn selective oxidn; gauze steel substrate metal oxide oxidn catalyst; leaf steel substrate vanadium phosphorus oxide oxidn catalyst
- IT Heat transfer
  - (in chromium-nickel steel gauze-supported cobalt and aluminum catalyst for carbon monoxide oxidation)
- IT Surface area
  - (of chromium-nickel steel gauze-supported cobalt and aluminum catalyst for carbon monoxide oxidation)
- IT Activation energy
  - (of oxidation; structured chromium-aluminum steel leaf-supported vanadium phosphorus oxide catalyst for oxidation of butane to maleic anhydride)
- IT Oxidation
  - Oxidation catalysts
    - (preparation of structured metal catalysts containing leaf or gauze steel substrates as a way to intensify oxidation reactions)
- IT 1344-28-1, Alumina, uses
  - RL: CAT (Catalyst use); USES (Uses)
    - (catalyst and catalytic support;
    - chromium-nickel steel gauze-supported cobalt and aluminum catalyst for carbon monoxide oxidation)
- IT 1307-96-6, Cobalt oxide, uses
  - RL: CAT (Catalyst use); USES (Uses)
    - (chromium-nickel steel gauze-supported cobalt and aluminum

- catalyst for carbon monoxide oxidation)
- IT 11136-69-9, Chromium nickel steel, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (gauze; preparation of structured metal catalysts containing leaf or gauze steel substrates as a way to intensify oxidation reactions)
- IT 56321-70-1, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (leaf and gauze; preparation of structured metal catalysts containing leaf or gauze steel substrates as a way to intensify oxidation reactions)
- IT 630-08-0, Carbon monoxide, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of structured metal catalysts containing leaf or gauze steel substrates as a way to intensify oxidation of)
- IT 65506-75-4, Vanadium phosphorus oxide  
 RL: CAT (Catalyst use); USES (Uses)  
 (structured chromium-aluminum steel leaf-supported vanadium phosphorus oxide catalyst for oxidation of butane to maleic anhydride)
- IT 106-97-8, n-Butane, reactions 108-31-6, Maleic anhydride, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (structured chromium-aluminum steel leaf-supported vanadium phosphorus oxide catalyst for oxidation of butane to maleic anhydride)
- L41 ANSWER 2 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2004:754892 HCAPLUS Full-text  
 DN 141:231307  
 TI Effect of the support on the surface composition of vanadium phosphate catalysts in the oxidative dehydrogenation of ethane  
 AU Casaletto, M. P.; Lisi, L.; Mattogno, G.; Patrono, P.; Ruoppolo, G.  
 CS Institute of Nanostructured Materials, CNR, Palermo, I-90146, Italy  
 SO Surface and Interface Analysis (2004), 36(8), 737-740  
 CODEN: SIANDQ; ISSN: 0142-2421  
 PB John Wiley & Sons Ltd.  
 DT Journal  
 LA English  
 AB Vanadyl phosphate catalysts supported on different oxides ( $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, SiO<sub>2</sub>) have been investigated by XPS. The surface chemical composition has been studied as a function of the thermal treatment under oxidizing (calcination) or reaction conditions in the oxidative dehydrogenation of ethane. Dispersion of vanadyl phosphates on  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> and TiO<sub>2</sub> results in the formation of vanadium species in different oxidation states, i.e. V<sup>5+</sup> phosphate, V<sup>5+</sup> and V<sup>4+</sup> oxide

species, whose relative fraction depends both on the support and on the reaction temperature. A progressive reduction of vanadium species occurs in the samples as an effect of the temperature. Vanadyl phosphates exhibit a stronger interaction with the titania support, which undergoes surface modifications after impregnation, thermal treatments and catalysis runs. A noticeable interaction of the alumina support and a poor dispersion of the active phase on silica are also revealed by XPS.

- CC 67-2 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
 Section cross-reference(s): 23, 51, 73
- ST support surface compn **vanadium phosphate catalyst** oxidative dehydrogenation ethane
- IT Calcination  
     **Catalyst supports**  
     Heat treatment  
     Oxidation  
     Surface composition  
     Valence  
         (effect of support on surface composition of **vanadium phosphate catalysts** in oxidative dehydrogenation of ethane)
- IT Oxides (inorganic), uses  
 RL: CAT (Catalyst use); CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)  
     (effect of support on surface composition of **vanadium phosphate catalysts** in oxidative dehydrogenation of ethane)
- IT Dehydrogenation **catalysts**  
     (oxidative; effect of support on surface composition of **vanadium phosphate catalysts** in oxidative dehydrogenation of ethane)
- IT 1344-28-1, **Alumina**, uses 7631-86-9, **Silica**, uses 13463-67-7, **Titania**, uses 14542-94-0, **Vanadium phosphate**  
 RL: CAT (Catalyst use); CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)  
     (effect of support on surface composition of **vanadium phosphate catalysts** in oxidative dehydrogenation of ethane)
- IT 74-84-0, **Ethane**, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
     (effect of support on surface composition of **vanadium phosphate catalysts** in oxidative dehydrogenation of ethane)



RE.CNT 14      THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 3 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 2004:741433 HCAPLUS Full-text  
DN 141:380161  
TI The novel and highly selective fumed silica-supported VPO  
for partial oxidation of n-butane to maleic anhydride  
AU Xiao, C. Y.; Chen, X.; Wang, Z. Y.; Ji, W. J.; Chen, Y.; Au, C. T.  
CS Mesoscopic Chemistry Lab, Department of Chemistry, Nanjing  
University, Nanjing, 210093, Peop. Rep. China  
SO Catalysis Today (2004), 93-95, 223-228  
CODEN: CATTEA; ISSN: 0920-5861  
PB Elsevier B.V.  
DT Journal  
LA English  
AB By applying fumed SiO<sub>2</sub> as a support and using polyethylene glycol  
(PEG) as an additive in the preparation medium and a deposition-  
precipitation method based on the organic phase, we prepared new  
fumed SiO<sub>2</sub>-supported VPO catalysts. The catalysts are the most  
selective in comparison to the various supported VPO counterparts for  
the partial oxidation of butane to maleic anhydride (MA). At 653K  
the catalysts provided butane conversion 33-40% and MA selectivity  
87-65 mol%. The catalysts not only showed good performance at lower  
reaction temps., but also maintained higher MA selectivity at  
different loadings. In addition to the unique nature of fumed SiO<sub>2</sub>,  
the highly uniform dispersion of the VPO component and the involved  
VPO-support interaction, co-existence of the predominant (VO)2P2O7  
phase and the minor VOP4 phase may also be beneficial to the good  
performance on these fumed SiO<sub>2</sub>-based catalysts. In addition,  
broadening of the (2 0 0) diffraction line of (VO)2P2O7 phase is an  
indication of structural disorder, one considered to be relevant to  
MA formation.  
CC 35-2 (Chemistry of Synthetic High Polymers)  
Section cross-reference(s): 67  
ST vanadyl pyrophosphate catalyst prepn fumed silica  
supported; vanadium phosphorus oxide catalyst selective  
oxidn butane; maleic anhydride prodn butane oxidn selective  
catalyst  
IT Polyoxymethylenes, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(in production of selective fumed silica-supported VPO for  
partial oxidation of butane to maleic anhydride)  
IT Oxidation catalysts  
(selective; production of selective fumed silica-supported  
VPO for partial oxidation of butane to maleic anhydride)  
IT 1314-62-1, Vanadium pentoxide, reactions 7664-38-2, Phosphoric

acid, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalyst precursor; in production of selective fumed  
silica-supported VFO for partial oxidation of butane to  
maleic anhydride)

IT 7631-86-9, Silica, uses

RL: CAT (Catalyst use); USES (Uses)  
(fumed; selective silica-supported VFO for partial  
oxidation of butane to maleic anhydride)

IT 25322-68-3, Polyethylene glycol

RL: NUU (Other use, unclassified); USES (Uses)  
(in production of selective fumed silica-supported VFO for  
partial oxidation of butane to maleic anhydride)

IT 12359-27-2P, Vanadyl phosphate 58834-75-6P, Vanadyl pyrophosphate  
65506-75-4P, Phosphorus vanadium oxide

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
(Preparation); USES (Uses)

(production of selective fumed silica-supported VFO for  
partial oxidation of butane to maleic anhydride)

IT 108-31-6P, Maleic anhydride, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)  
(selective fumed silica-supported VFO for partial  
oxidation of butane to maleic anhydride)

IT 106-97-8, Butane, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(selective fumed silica-supported VFO for partial  
oxidation of butane to maleic anhydride)

OSC.G 6 THERE ARE 6 CAPLUS RECORDS THAT CITE THIS RECORD (6  
CITINGS)

RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 4 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2004:504957 HCAPLUS Full-text

DN 141:191097

TI Effect of the preparation technique on the catalytic  
performances of TiO<sub>2</sub> supported vanadium phosphate  
in the oxidative dehydrogenation of ethane

AU Casaletto, M. P.; Lisi, L.; Mattogno, G.; Patrono, P.; Pinzari, F.;  
Ruoppolo, G.

CS Istituto per lo Studio dei Materiali Nanostrutturati, CNR, Palermo,  
Italy

SO Catalysis Today (2004), 91-92, 271-274

CODEN: CATTEA; ISSN: 0920-5861

PB Elsevier Science B.V.

DT Journal

LA English

- AB TiO<sub>2</sub> supported VOP04 catalysts, prepared by direct impregnation of TiO<sub>2</sub> with VOP04 or by dispersing a V2O5 precursor on previously phosphated titania, have been investigated for the oxidative dehydrogenation of ethane to ethylene at 823 K. The catalysts have been characterized with XRD, BET surface area measurements, XPS, TPR and NH<sub>3</sub> TPD techniques. Preparation method influences surface composition of the sample, formation of V5+ oxide being favored with respect to V4+ oxide for the catalyst prepared in two steps, whereas a comparable fraction of VOP04 is formed on both samples. Results of catalytic tests suggests that the presence of V4+ strongly improves performances leading to higher ethylene yields.
- CC 35-2 (Chemistry of Synthetic High Polymers)  
Section cross-reference(s): 45, 67
- ST ethane oxidative dehydrogenation catalyst titania supported vanadium phosphate
- IT Surface area  
Surface composition  
(of TiO<sub>2</sub> supported vanadium phosphate in oxidative dehydrogenation of ethane)
- IT Dehydrogenation catalysts  
(oxidative; effect of preparation technique on catalytic performances of TiO<sub>2</sub> supported vanadium phosphate in oxidative dehydrogenation of ethane)
- IT 13463-67-7, Titanium oxide (TiO<sub>2</sub>),  
uses  
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
(catalyst support; effect of preparation technique on catalytic performances of TiO<sub>2</sub> supported vanadium phosphate in oxidative dehydrogenation of ethane)
- IT 1314-62-1, Vanadium oxide (V2O5), uses 14542-94-0,  
Vanadium phosphate  
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
(effect of preparation technique on catalytic performances of TiO<sub>2</sub> supported vanadium phosphate in oxidative dehydrogenation of ethane)
- IT 74-84-0, Ethane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(effect of preparation technique on catalytic performances of TiO<sub>2</sub> supported vanadium phosphate in oxidative dehydrogenation of ethane)
- IT 74-85-1P, Ethylene, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(effect of preparation technique on catalytic performances of TiO<sub>2</sub> supported vanadium phosphate in oxidative dehydrogenation of ethane)
- OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1

## CITINGS)

RE.CNT 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 5 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 2004:455704 HCAPLUS Full-text  
DN 141:158890  
TI Preparation of Novel Composite VPO/Fumed Silica  
Catalyst for Partial Oxidation of n-Butane  
AU Zhou, Z. Q.; Xu, H. Y.; Ji, W. J.; Chen, Y.  
CS Key Laboratory of Mesoscopic Chemistry of the Ministry of Education,  
Department of Chemistry, Nanjing University, Nanjing, 210093, Peop.  
Rep. China  
SO Catalysis Letters (2004), 96(3-4), 221-226  
CODEN: CALEER; ISSN: 1011-372X  
PB Kluwer Academic/Plenum Publishers  
DT Journal  
LA English  
OS CASREACT 141:158890  
AB A vanadyl phosphate (VPO)/fumed SiO<sub>2</sub> catalyst was prepared by  
deposition-precipitation of (VO)<sub>2</sub>P<sub>2</sub>O<sub>7</sub> onto the SiO<sub>2</sub> support and the  
catalyst was evaluated in partial oxidation of n-butane to maleic  
anhydride. At 653-693 K the fumed SiO<sub>2</sub>-based catalysts showed good  
activity and maintained sufficiently high selectivity toward maleic  
anhydride (MA) in comparison to conventional supported VPO catalysts  
. The catalyst with 30% VPO content showed butane conversion of 60%  
and MA selectivity of 58 mol% at 673 K. The turnover rates of low  
loading catalyst was higher than that of high loading and unsupported  
catalyst. The unique interaction between VPO and fumed SiO<sub>2</sub> and co-  
existence of dominant (VO)<sub>2</sub>P<sub>2</sub>O<sub>7</sub> and minor VOPO<sub>4</sub> phases in non-  
equilibrated catalysts favor MA formation. The presence of  
poly(ethylene glycol) (PEG) in the preparation medium enhanced the  
dispersion of VPO and consequently, the selectivity of the catalyst.  
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 67  
ST vanadyl phosphate fumed silica support oxidn  
catalyst prepn; butane partial oxidn maleic anhydride  
vanadyl phosphate silica catalyst  
IT Catalyst supports  
(deposition-precipitation method in preparation of VPO/fumed  
silica catalyst with high activity in partial oxidation of n-butane  
to maleic anhydride)  
IT Polyoxyalkylenes, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(deposition-precipitation method in preparation of VPO/fumed  
silica

- catalyst with high activity in partial oxidation of n-butane to maleic anhydride)
- IT Oxidation catalysts  
(partial; deposition-precipitation method in preparation of VPO/fumed silica catalyst with high activity in partial oxidation of n-butane to maleic anhydride)
- IT Oxidation catalysts  
(selective; deposition-precipitation method in preparation of VPO/fumed silica catalyst with high activity in partial oxidation of n-butane to maleic anhydride)
- IT 7631-86-9, Silica, processes  
RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process); USES (Uses)  
(amorphous, fume, partial oxidation catalyst support; deposition-precipitation method in preparation of VPO/fumed silica catalyst with high activity in partial oxidation of n-butane to maleic anhydride)
- IT 108-31-6P, Maleic anhydride, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(deposition-precipitation method in preparation of VPO/fumed silica catalyst with high activity in partial oxidation of n-butane to maleic anhydride)
- IT 106-97-8, n-Butane, reactions 1314-62-1, Vanadium oxide (V2O5), reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(deposition-precipitation method in preparation of VPO/fumed silica catalyst with high activity in partial oxidation of n-butane to maleic anhydride)
- IT 25322-68-3, Poly(ethylene glycol)  
RL: NUU (Other use, unclassified); USES (Uses)  
(dispersant in catalyst precipitation; deposition-precipitation method in preparation of VPO/fumed silica catalyst with high activity in partial oxidation of n-butane to maleic anhydride)
- IT 45021-28-1P 58834-75-6P, Vanadium oxide pyrophosphate (V2O2(P2O7))  
RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(partial oxidation catalyst containing; deposition-precipitation method in preparation of VPO/fumed silica catalyst with high activity in partial oxidation of n-butane to maleic anhydride)
- IT 12359-27-2P, Vanadyl phosphate  
RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic

preparation); PREP (Preparation); USES (Uses)  
 (partial oxidation **catalyst**; deposition-precipitation method in  
 preparation of VPO/fumed silica **catalyst** with high  
 activity in partial oxidation of n-butane to maleic anhydride)

OSC.G 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS RECORD (7  
 CITINGS)

RE.CNT 32 THERE ARE 32 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 6 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2004:424755 HCAPLUS Full-text  
 DN 141:125344  
 TI An XPS study of titania-supported vanadyl phosphate  
**catalysts** for the oxidative dehydrogenation of ethane  
 AU Casaleto, M. P.; Lisi, L.; Mattogno, G.; Patrono, P.; Ruoppolo, G.  
 CS CNR, Institute for the Study of Nanostructured Materials, Palermo,  
 I-90146, Italy  
 SO Applied Catalysis, A: General (2004), 267(1-2), 157-164  
 CODEN: ACAGE4; ISSN: 0926-860X  
 PB Elsevier Science B.V.  
 DT Journal  
 LA English  
 AB The effect of thermal treatment and number of reaction cycles on  
 activity of titania-supported vanadyl phosphate (VOP04) **catalysts** in  
 oxidative dehydrogenation (ODH) of ethane was studied using XPS. The  
 surface characterization of monolayer (9.6%) and sub-monolayer (6.5%)  
 VOP04 samples was performed after calcination in air and after  
**catalytic** tests at different temps. (450 and 550°). Vanadyl  
 phosphates are well dispersed on the TiO2 surface. The oxidation  
 state, surface distribution, and evolution of vanadium and titanium  
 species were analyzed by the V 2p3/2 and Ti 2p3/2 peak-fitting  
 procedure. The interaction with the support leads to different  
**vanadium** species, V5+ **phosphate**, V5+ and V4+ oxide species, whose  
 relative fraction depends on the nature of the support and on  
 treatments. The amount of tetravalent vanadium species in the samples  
 progressively increases with temperature Surface modifications of  
 the **titania support** were characterized by XPS after impregnation,  
 calcination, and **catalytic** tests.

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 23, 67

ST vanadyl phosphate **catalyst** **titania**  
**support** activity thermal treatment cycling; oxidative  
 dehydrogenation ethane vanadyl phosphate **titania catalyst**

IT Calcination  
 Surface composition  
 (effect of thermal treatment and reaction cycle number on activity  
 of titania-supported vanadyl phosphate **catalysts** in

oxidative dehydrogenation of ethane)  
 IT Dehydrogenation **catalysts**  
 (oxidative; effect of thermal treatment and reaction cycle number  
 on activity of titania-supported vanadyl phosphate **catalysts**  
 in oxidative dehydrogenation of ethane)  
 IT 7440-32-6, Titanium, uses 7440-62-2, Vanadium, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (dehydrogenation **catalyst** containing; effect of thermal  
 treatment and reaction cycle number on activity of titania-  
 supported vanadyl phosphate **catalysts** in oxidative  
 dehydrogenation of ethane)  
 IT 12359-27-2, Vanadium oxide phosphate (VO(P04))  
 RL: CAT (Catalyst use); CPS (Chemical process); PEP (Physical,  
 engineering or chemical process); PRP (Properties); PROC (Process);  
 USES (Uses)  
 (dehydrogenation **catalyst**; effect of thermal treatment  
 and reaction cycle number on activity of titania-supported vanadyl  
 phosphate **catalysts** in oxidative dehydrogenation of  
 ethane)  
 IT 74-84-0, Ethane, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (effect of thermal treatment and reaction cycle number on activity  
 of titania-supported vanadyl phosphate **catalysts** in  
 oxidative dehydrogenation of ethane)  
 IT 13463-67-7, Titania, processes  
 RL: CAT (Catalyst use); CPS (Chemical process); PEP (Physical,  
 engineering or chemical process); PRP (Properties); PROC (Process);  
 USES (Uses)  
 (support; effect of thermal treatment and reaction  
 cycle number on activity of titania-supported vanadyl phosphate  
**catalysts** in oxidative dehydrogenation of ethane)  
 OSC.G 11 THERE ARE 11 CAPLUS RECORDS THAT CITE THIS RECORD (11  
 CITINGS)  
 RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT  
 L41 ANSWER 7 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2003:722241 HCAPLUS Full-text  
 DN 140:339077  
 TI Preparation of 2-chloro-6-fluorobenzonitrile  
 IN Zheng, Qiong; Li, Xiaoyun; Yu, Peng; Huang, Chi; Xie, Guangyong;  
 Yang, Yuanqing; He, Xufeng  
 PA Wuhan University, Peop. Rep. China; Wenbei Science and Technology  
 Co., Ltd.  
 SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 5 pp.

CODEN: CNXXEV

DT Patent

LA Chinese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	CN 1379022	A	20021113	CN 2002-115744	20020423
				<--	
	CN 1133619	C	20040107		
PRAI	CN 2002-115744		20020423	<--	
OS	CASREACT 140:339077				
AB	2-Chloro-6-fluorobenzonitrile is synthesized by gas-phase ammoxidn. of 2-chloro-6-fluorotoluene with NH3 and air in the presence of catalyst at 623-723K. The molar ratio of air and NH3 to 2-chloro-6-fluorotoluene is 8-60 and 2-12, resp. The catalyst is VPaCbdcEdOX/SiO2 (C = Ti, Fe, Ni, Co, or Bi; D = Mn, Cr, Mo, Cu, Zn, or Sn; E = B, Na, K, Li, or Mg; a = 1, b = 0.5-2.5; c = 0.1-1.5; and d = 0.5-2.5).				
IC	ICM C07C255-50 ICS C07C253-24				
CC	25-20 (Benzene, Its Derivatives, and Condensed Benzenoid Compounds) Section cross-reference(s): 67				
ST	chlorofluorobenzonitrile prepn ammoxidn catalyst				
IT	Ammoxidation (preparation of 2-chloro-6-fluorobenzonitrile)				
IT	Ammoxidation catalysts (preparation of 2-chloro-6-fluorobenzonitrile by ammoxidn. of 2-chloro-6-fluorotoluene in presence of vanadium-phosphorus oxide)				
IT	475504-34-8P, Vanadium oxide phosphate (VO0.8(PO4)) 679842-58-1P RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses) (preparation of 2-chloro-6-fluorobenzonitrile)				
IT	668-45-1P, 2-Chloro-6-fluorobenzonitrile RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation) (preparation of 2-chloro-6-fluorobenzonitrile)				
IT	443-83-4, 2-Chloro-6-fluorotoluene RL: RCT (Reactant); RACT (Reactant or reagent) (preparation of 2-chloro-6-fluorobenzonitrile)				
IT	7631-86-9, Silica, uses RL: CAT (Catalyst use); USES (Uses) (support; preparation of 2-chloro-6-fluorobenzonitrile)				



L41 ANSWER 8 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2003:722207 HCAPLUS Full-text  
 DN 140:339076  
 TI Preparation and application of ammoxidation **catalyst** for  
 preparing 2-chloro-6-fluorobenzonitrile  
 IN Zheng, Qiong; Li, Xiaoyun; Yu, Peng; Huang, Chi; Xie, Guangyong;  
 Yang, Yuanqing; He, Xufeng  
 PA Wuhan Univ., Peop. Rep. China; Wuhan Wenbei Science and Technology  
 Co., Ltd.  
 SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 4 pp.  
 CODEN: CNXXEV  
 DT **Patent**  
 LA Chinese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	CN 1378877	A	20021113	CN 2002-115745	200204 23

&lt;--

CN 1132690 C 20031231  
 PRAI CN 2002-115745 20020423 <--  
 OS CASREACT 140:339076  
 AB The title **catalyst** can be formulated by  $\text{VPaCbDcEdOx/SiO}_2$ , where C =  
 Ti, Fe, Ni or Bi; D = Mn, Cr, Cu, Zn or Sn, E = B, Na, K, Li or Mg, a  
 = 1, b = 0.5-2.5, c = 0.1-1.5, d = 0.5-2.5, e = 0.1-1.5, and x  
 balances. The **catalyst** is prepared by impregnating the support with  
 water-soluble precursor of active component, stewing, aging, and  
 activating at 673-923 K for 2-20 h. The **catalyst** is highly active  
 and selective in preparation of 2-chloro-6-fluorobenzonitrile by  
 ammoxidn. of 2-chloro-6-fluorotoluene.  
 IC ICM B01J027-198  
 ICS C07C255-50; C07C253-24  
 CC 25-20 (Benzene, Its Derivatives, and Condensed Benzenoid Compounds)  
 Section cross-reference(s): 67  
 ST chlorofluorobenzonitrile prepn ammoxidn **catalyst**  
 IT Ammoxidation **catalysts**  
 (preparation and application of ammoxidn. **catalyst** for  
 preparation of 2-chloro-6-fluorobenzonitrile)  
 IT Silica gel, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (support; preparation and application of ammoxidn.  
**catalyst** for preparation of 2-chloro-6-fluorobenzonitrile)  
 IT 475504-34-8P, Vanadium oxide **phosphate**  
 (VOO.8(PO4)) 679842-58-1P

RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(preparation and application of ammoxidn. catalyst for preparation of 2-chloro-6-fluorobenzonitrile)

IT 668-45-1P, 2-Chloro-6-fluorobenzonitrile

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(preparation and application of ammoxidn. catalyst for preparation of 2-chloro-6-fluorobenzonitrile)

IT 443-83-4, 2-Chloro-6-fluorotoluene

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation and application of ammoxidn. catalyst for preparation of 2-chloro-6-fluorobenzonitrile)

L41 ANSWER 9 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2003:698035 HCAPLUS Full-text

DN 140:77432

TI Vanadyl phosphate dihydrate supported on oxides for the catalytic conversion of ethane to ethylene

AU Lisi, L.; Patrono, P.; Ruoppolo, G.

CS Istituto di Ricerche sulla Combustione, CNR, Naples, 80125, Italy

SO Journal of Molecular Catalysis A: Chemical (2003),

204-205, 609-616

CODEN: JMCCF2; ISSN: 1381-1169

PB Elsevier Science B.V.

DT Journal

LA English

AB VOPO4.2H2O supported as a mono-layer on TiO2, Al2O3 and SiO2 and as a multi-layer on TiO2 was investigated for the oxidative dehydrogenation of ethane to ethylene in the temperature range 450-550°. The catalysts were characterized with X-ray diffraction patterns (XRD), BET surface area measurements and ESR and temperature programmed reduction (TPR) techniques comparing their properties to those of bulk VOPO4.2H2O. TiO2 promotes the best dispersion of vanadyl phosphate for mono-layer catalysts, whereas the formation of VOPO4 bulk-like particles was detected for SiO2 supported mono-layer catalyst or when the coverage far exceeds the mono-layer on TiO2. A fraction of vanadium is present as V(IV) in all catalysts, probably as VO(H2O)2+-O-P species. Reducibility of vanadium phosphate is enhanced by deposition on supports in extent depending on the strength of the interaction support-active phase, TiO2 mono-layer catalyst being the most reducible. The improvement of catalytic activity for supported catalysts has been related to the increase of both surface area and reducibility with respect to bulk VOPO4. Ethylene selectivity increases with the temperature only for well dispersed samples due to a significant increase of V(IV) containing sites at 550° observed for these samples.

CC 35-2 (Chemistry of Synthetic High Polymers)  
 ST vanadyl phosphate oxide **catalyst** conversion ethane  
 ethylene  
 IT 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 12293-87-7,  
 Vanadyl phosphate dihydrate 13463-67-7, Titania, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (Vanadyl phosphate dihydrate supported on oxides for the  
 catalytic conversion of ethane to ethylene)  
 IT 74-84-0, Ethane, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (Vanadyl phosphate dihydrate supported on oxides for the  
 catalytic conversion of ethane to ethylene)  
 IT 74-85-1P, Ethylene, preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (Vanadyl phosphate dihydrate supported on oxides for the  
 catalytic conversion of ethane to ethylene)  
 OSC.G 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3  
 CITINGS)  
 RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 10 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2003:313356 HCAPLUS Full-text  
 DN 139:86955  
 TI Comparative studies on the VPO specimen supported on  
 mesoporous Al-containing MCM-41 and large-pore silica  
 AU Nie, Weiyang; Wang, Zhongyu; Ji, Weijie; Chen, Yi; Au, C. T.  
 CS Department of Chemistry, Laboratory of Mesoscopic Materials Science,  
 Nanjing University, Nanjing, 210093, Peop. Rep. China  
 SO Applied Catalysis, A: General (2003), 244(2), 265-272  
 CODEN: ACAGE4; ISSN: 0926-860X  
 PB Elsevier Science B.V.  
 DT Journal  
 LA English  
 OS CASREACT 139:86955  
 AB An Al-MCM-41 material was studied and compared with amorphous large-  
 pore silica, as the **support** material for vanadium-phosphorus-oxide  
 (VPO) catalysts. The support effects on the physico-chemical  
 characteristics and the catalytic activity of VPO catalysts in  
 selective oxidation of n-butane were studied. Differences in support  
 composition and in VPO loading, physico-chemical properties of  
 supported VPO, namely, surface area, pore size distribution, and  
 structural features were identified, which have a marked influence on  
 catalyst performance. Compared with large-pore silica-VPO, the Al-  
 MCM-41-VPO catalyst exhibited a notable enhancement in maleic  
 anhydride (MA) selectivity and a slight decrease in n-butane  
 conversion, due to interactions between VPO and Al-MCM-41 support.

Butane conversion increased with increasing vanadium loading, accompanied by a remarkable decrease in MA selectivity, likely due to increased number of sites that are more reactive but less selective. From a comparison of catalyst preparation methods, precipitation in organic medium was superior to acidic aqueous impregnation, and the unique structure of MCM-41 plays an important role on the physico-chemical properties of supported VPO.

- CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 35, 67
- ST aluminum MCM41 zeolite support **vanadium phosphate catalyst**; surface area pore size zeolite support comparison **silica**
- IT Zeolite MCM-41  
RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(aluminum-containing, **catalyst** support; role of preparation method and structure of mesoporous Al-MCM-41 support on selectivity of **VPO catalyst** in selective oxidation of butane to maleic anhydride)
- IT **Catalyst supports**  
Crystallinity  
Pore size distribution  
Surface area  
(role of preparation method and structure of mesoporous Al-MCM-41 support on selectivity of **VPO catalyst** in selective oxidation of butane to maleic anhydride)
- IT **Oxidation catalysts**  
(selective; role of preparation method and structure of mesoporous Al-MCM-41 support on selectivity of **VPO catalyst** in selective oxidation of butane to maleic anhydride)
- IT 108-31-6P, Maleic anhydride, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(role of preparation method and structure of mesoporous Al-MCM-41 support on selectivity of **VPO catalyst** in selective oxidation of butane to maleic anhydride)
- IT 106-97-8, n-Butane, reactions 1302-42-7 6834-92-0  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(role of preparation method and structure of mesoporous Al-MCM-41 support on selectivity of **VPO catalyst** in selective oxidation of butane to maleic anhydride)
- IT 65506-75-4, Vanadium phosphorus oxide  
RL: CAT (Catalyst use); USES (Uses)  
(selective oxidation **catalyst**; role of preparation method and structure of mesoporous Al-MCM-41 support on selectivity of **VPO catalyst** in selective oxidation of butane to maleic anhydride)

IT 57-09-0, Cetyltrimethylammonium bromide  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (zeolite preparation template; role of preparation method and  
 structure of  
 mesoporous Al-MCM-41 support on selectivity of VPO  
 catalyst in selective oxidation of butane to maleic  
 anhydride)

OSC.G 6 THERE ARE 6 CAPLUS RECORDS THAT CITE THIS RECORD (6  
 CITINGS)

RE.CNT 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 11 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2003:26565 HCAPLUS Full-text  
 DN 139:6649  
 TI 3,4-Dichlorotoluene ammoxidation to 3,4-dichlorobenzonitrile over  
 VPO/SiO2 catalyst

AU Chi, Huang; Di, Xiao; Xu, Hai-xia; Zheng, Qiong; Chen, Yuan-yin  
 CS College of Chemistry and Molecular Sciences, Wuhan University,  
 Wuhan, 430072, Peop. Rep. China  
 SO Wuhan University Journal of Natural Sciences (2002), 7(3),  
 353-355  
 CODEN: WUNSWF; ISSN: 1007-1202

PB Wuhan University  
 DT Journal  
 LA English  
 OS CASREACT 139:6649

AB Ammoxidn. of 3,4-dichlorotoluene (DCT) to prepare 3,4-  
 dichlorobenzonitrile (DCBN) over silica supported vanadium phosphorus  
 oxide catalysts has been studied. On the VPO/SiO2 catalyst, the  
 influence of the reaction temperature, the molar ratio of air/DCT,  
 the molar ratio of NH3/DCT in the feed gas and the space velocity  
 (v5) on the conversion, yield and selectivity was observed. The most  
 appropriate reaction condition is: reaction T=673 K, n(DCT): n(NH3):  
 n(air)=1: 7: 30 and v5=250 h<sup>-1</sup>. At this optimum reaction condition,  
 the conversion of DCT is 97.8%; the molar yield of DCBN is 67.4%.  
 The addition of elemental P can improve the yield of DCBN compared  
 with VO/SiO2 catalyst.

CC 25-20 (Benzene, Its Derivatives, and Condensed Benzenoid Compounds)  
 Section cross-reference(s): 45

ST ammoxidn dichlorotoluene dichlorobenzonitrile vanadium phosphorus  
 oxide silica catalyst

IT Ammoxidation  
 Ammoxidation catalysts  
 (ammoxidn. of dichlorotoluene to dichlorobenzonitrile over  
 VPO/SiO2 catalyst)

IT Catalysts

(phosphorus promoters; ammoxidn. of dichlorotoluene to dichlorobenzonitrile over VPO/SiO2 catalyst)

IT Catalyst supports  
(silica; ammoxidn. of dichlorotoluene to dichlorobenzonitrile over VPO/SiO2 catalyst)

IT 95-75-0, 3,4-Dichlorotoluene  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(ammoxidn. of dichlorotoluene to dichlorobenzonitrile over VPO/SiO2 catalyst)

IT 6574-99-8P, 3,4-Dichlorobenzonitrile  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(ammoxidn. of dichlorotoluene to dichlorobenzonitrile over VPO/SiO2 catalyst)

IT 7723-14-0, Phosphorus, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst promoter; ammoxidn. of dichlorotoluene to dichlorobenzonitrile over VPO/SiO2 catalyst)

IT 1314-62-1, Vanadium pentoxide, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, with phosphoric acid; ammoxidn. of dichlorotoluene to dichlorobenzonitrile over VPO/SiO2 catalyst)

IT 7664-38-2, Phosphoric acid, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, with vanadium pentoxide; ammoxidn. of dichlorotoluene to dichlorobenzonitrile over VPO/SiO2 catalyst)

IT 7631-86-9, Silica, uses  
RL: CAT (Catalyst use); USES (Uses)  
(supports; ammoxidn. of dichlorotoluene to dichlorobenzonitrile over VPO/SiO2 catalyst)

L41 ANSWER 12 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 2002:924528 HCAPLUS Full-text  
DN 137:371713  
TI Manufacture of 3,4-dichlorobenzonitrile by catalytic  
ammoxidation of 3,4-dichlorotoluene  
IN Zheng, Qiong; Huang, Chi; Xie, Guangyong  
PA Wuhan Univ., Peop. Rep. China  
SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 6 pp.  
CODEN: CNXXEV  
DT Patent  
LA Chinese  
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI CN 1328875 A 20020102 CN 2000-114641 200006  
20

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CN 1137779 C 20040211  
PRAI CN 2000-114641 20000620 <--

AB 3,4-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>CN was manufactured by ammoxidn. of 3,4-Cl<sub>2</sub>C<sub>6</sub>H<sub>3</sub>Me at 623-723°K with air in the presence of NH<sub>3</sub> (at resp. mol. ratio 1:2-12) by use of SiO<sub>2</sub>-supported oxide catalysts VaPbQcDdEeOx (Q = Ti, Mn, Cr, Mo, B; D = Fe, Ni, Co, Cu; E = Zn, K, Li, Mg, Sn; a = 1; b = 0.5-2.5; c = 0-1.3; d = 0-1.2; e = 0-0.4). The catalysts were prepared by impregnation of silica sol support and activation at 673-923°K for 2-20 h.

IC ICM C07K014-435  
ICS C07K014-00; C07K016-18; C07K016-00; C07H021-00; C12N015-10; C12N015-11; C12N015-12; C12N015-63; B01J027-185; B01J027-195; B01J027-188; B01J027-187; B01J027-186; C07C255-50; C07C253-28

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 25, 67

ST chlorobenzonitrile manuf vanadium phosphorus metal oxide catalyst; ammonia dichlorotoluene oxidn vanadium phosphorus oxide catalyst; titanium vanadium phosphorus oxide oxidn catalyst dichlorobenzonitrile manuf

IT Ammoxidation catalysts  
(silica-supported; manufacture of dichlorobenzonitrile by ammoxidn. of dichlorotoluene in presence of vanadium phosphorus oxide catalysts)

IT 475504-34-8, Vanadium phosphorus oxide [VP04.8] 475504-35-9, Titanium vanadium oxide phosphate (Ti<sub>0.8</sub>VO<sub>1.7</sub>(PO<sub>4</sub>)<sub>1.2</sub>) 475504-36-0, Iron vanadium metaphosphate oxide (Fe<sub>0.7</sub>V(PO<sub>3</sub>)<sub>2.4</sub>O<sub>2.2</sub>) 475504-37-1, Vanadium zinc oxide phosphate (VZn<sub>0.8</sub>O<sub>2.15</sub>(PO<sub>4</sub>)<sub>0.7</sub>) 475504-38-2 475504-39-3 475504-40-6 475504-41-7 475504-42-8 475504-43-9, Iron tin vanadium borate oxide phosphate (Fe<sub>0.8</sub>Sn<sub>0.1</sub>V(BO<sub>3</sub>)<sub>0.1</sub>O<sub>2.75</sub>(PO<sub>4</sub>)<sub>0.5</sub>)  
RL: CAT (Catalyst use); USES (Uses)  
(manufacture of dichlorobenzonitrile by ammoxidn. of dichlorotoluene in presence of vanadium phosphorus oxide catalysts)

IT 6574-99-8P, 3,4-Dichlorobenzonitrile  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of dichlorobenzonitrile by ammoxidn. of dichlorotoluene in presence of vanadium phosphorus oxide catalysts)

IT 7664-41-7, Ammonia, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)

(manufacture of dichlorobenzonitrile by ammoxidn. of dichlorotoluene in presence of vanadium phosphorus oxide **catalysts**)

IT 95-75-0, 3,4-Dichlorotoluene  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidation; manufacture of dichlorobenzonitrile by ammoxidn. of dichlorotoluene in presence of vanadium phosphorus oxide **catalysts**)

IT 7631-86-9, Silica, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (support; manufacture of dichlorobenzonitrile by ammoxidn. of dichlorotoluene in presence of vanadium phosphorus oxide **catalysts**)

L41 ANSWER 13 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2002:924527 HCAPLUS Full-text

DN 137:371712

TI Manufacture of 2,4-dichlorobenzonitrile by ammoxidation of 2,4-dichlorotoluene with vanadium titanium phosphorus oxide **catalysts**

IN Zheng, Qiong; Huang, Chi; Xie, Guangyong

PA Wuhan Univ., Peop. Rep. China

SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 6 pp.

CODEN: CNXXEV

DT **Patent**

LA Chinese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	CN 1328874	A	20020102	CN 2000-114640	20000620

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	CN 1137778	C	20040211	
PRAI	CN 2000-114640		20000620	<--

AB 2,4-Cl2C6H3CN was manufactured by ammoxidn. of 2,4-Cl2C6H3Me in the presence of highly active and selective oxide **catalysts** VaTibPcDdEeOx (D = Ti, Fe, Ni, Co, Bi, Mo, Cr, Mo; E = Cu, Zn, Sn, B, K, Li, Mg; a = 1; b = 0.3-2.5; c = 0.5-1.7; d = 0-1.2; e = 0-0.9, x = balance). The catalyst was prepared by impregnating the silica sol carrier with aqueous solns. of active components, aging, and activating at 300-650° for 2-20 h.

IC ICM B01J027-14

ICS B01J027-185; B01J027-186; B01J027-199; C07C255-50; C07C253-24

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)

Section cross-reference(s): 25, 67



ST ammoxidn catalyst dichlorobenzonitrile manuf; vanadium  
titanium phosphorus metal oxide catalyst dichlorotoluene  
ammoxidn

IT Ammoxidation catalysts  
(silica-supported; manufacture of dichlorobenzonitrile by  
ammoxidn. of  
dichlorotoluene with vanadium titanium phosphorus oxide  
catalysts)

IT 475503-99-2, Titanium vanadium oxide phosphate  
475504-00-8 475504-01-9 475504-02-0 475504-03-1 475504-04-2  
RL: CAT (Catalyst use); USES (Uses)  
(manufacture of dichlorobenzonitrile by ammoxidn. of  
dichlorotoluene  
with vanadium titanium phosphorus oxide catalysts)

IT 6574-98-7P, 2,4-Dichlorobenzonitrile  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manufacture of dichlorobenzonitrile by ammoxidn. of  
dichlorotoluene  
with vanadium titanium phosphorus oxide catalysts)

IT 95-73-8, 2,4-Dichlorotoluene  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(manufacture of dichlorobenzonitrile by ammoxidn. of  
dichlorotoluene  
with vanadium titanium phosphorus oxide catalysts)

IT 7631-86-9, Silica, uses  
RL: CAT (Catalyst use); USES (Uses)  
(support; manufacture of dichlorobenzonitrile by ammoxidn.  
of dichlorotoluene with vanadium titanium phosphorus oxide  
catalysts)

L41 ANSWER 14 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 2002:789122 HCAPLUS Full-text  
DN 137:264705  
TI Catalysts for p-anisonitrile preparation by ammoxidation  
process  
IN Xie, Guangyong; Zheng, Qiong; Huang, Chi  
PA Wuhan Univ., Peop. Rep. China  
SO Faming Zhuanni Shenqing Gongkai Shuomingshu, 6 pp.  
CODEN: CNXXEV  
DT Patent  
LA Chinese  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	CN 1318430	A	20011024	CN 2001-106634	200104

<--

CN 1112244 C 20030625

PRAI CN 2001-106634 20010418 <--

AB The **catalysts**, having high activity, selectivity and stability, contain silica gel (A) as carrier and VaPbMocDdEeOx as active component (B), wherein D=Ti, Fe, Ni, Co, Bi, Mn or Cr, E=Cu, Zn, Sn, B, K, Li or Mg, a=1, b=0.3-2.5, c=0.2-1.6, d=0-1.2, e=0-0.9, and x is the balance, and are prepared by impregnating A with aqueous solution of B, stirring, resting and activating at 673-923 K for 2-20 h.

IC ICM B01J027-198

ICS C07C255-54; C07C253-24

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes) Section cross-reference(s): 67

ST metal oxide complex ammoxidn **catalyst** anisonitrile prepn

IT Ammoxidation

Ammoxidation **catalysts**

(preparation of **catalysts** for p-anisonitrile preparation through ammoxidn. process)

IT 7631-86-9, **Silica**, uses

RL: CAT (Catalyst use); USES (Uses)

(**catalyst support**; in preparation of **catalysts** for p-anisonitrile preparation through ammoxidn. process)

IT 1314-62-1, Vanadium pentoxide, reactions 7664-38-2, Phosphoric acid, reactions 10043-35-3, Boric acid, reactions 10361-44-1, Bismuth nitrate 12027-67-7, Ammonium molybdate ((NH<sub>4</sub>)<sub>6</sub>Mo<sub>7</sub>O<sub>24</sub>)

RL: RCT (Reactant); RACT (Reactant or reagent)

(in preparation of **catalysts** for p-anisonitrile preparation through ammoxidn. process)

IT 104-93-8, p-Methoxytoluene

RL: RCT (Reactant); RACT (Reactant or reagent)

(in preparation of p-anisonitrile by ammoxidn. process)

IT 874-90-8P, p-Anisonitrile

RL: IMF (Industrial manufacture); PREP (Preparation)

(preparation by ammoxidn. process from p-methoxytoluene)

IT 462125-18-4P, Molybdenum **vanadium oxide phosphate** (MoV<sub>4</sub>(PO<sub>4</sub>)) 462125-19-5P 462125-20-8P 462125-21-9P 462125-22-0P 462125-23-1P

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(silica-supported; preparation of **catalysts** for p-anisonitrile preparation through ammoxidn. process)

L41 ANSWER 15 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2002:268113 HCAPLUS Full-text

DN 137:203654

TI Propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica

AU Marengo, S.; Patrono, P.; Comotti, P.; Galli, G.; Galli, P.; Massucci, M. A.; Meloni, M. T.

CS Stazione Sperimentale per i Combustibili, San Donato Mil, Italy

SO Applied Catalysis, A: General (2002), 230(1-2), 219-231  
CODEN: ACAGE4; ISSN: 0926-860X

PB Elsevier Science B.V.

DT Journal

LA English

AB Mono-substituted M3+ compds. of vanadyl phosphate dihydrate VOP04·2H2O, with formula  $[M(H_2O)]_xV01-xP04 \cdot nH_2O$  (M=Al, Fe, Cr, x=0.15-0.20, n=2-2.40), and a di-substituted compound with formula  $Fe0.08Cr0.08(H_2O)0.16V00.84P04 \cdot 2.9H_2O$ , either pure or supported, were characterized by XRD, EDAX, TG/DTA, physisorption and chemisorption measurements, and tested as catalysts in the partial oxidation of propane. Incorporation of the M3+ cation into VOP04 produces a marked increase in surface area, pore volume, and reducibility, with subsequent enhancement of the catalytic activity. Upon adsorption of these compds. on titania, a homogeneous distribution of highly dispersed species is obtained, whereas on silica small conglomerates of crystalline phases of VOP and FeVOP are formed, presumably by polymerization on the acidic surface sites of the support. The titania-supported samples exhibit higher catalytic activity and better selectivity to partial oxidation products (acetic acid and propene), compared to silica-based materials; these effects are attributed to the higher dispersion and reducibility of the surface species. Propane oxidation over the supported materials undergoes transition to the ignited state, in which surface temps. up to 900 K are attained, and homogeneous reactions yield mainly propene and CO.

CC 51-11 (Fossil Fuels, Derivatives, and Related Products)

ST Section cross-reference(s): 45, 67

ST partial oxidn propane trivalent cation substituted vanadium phosphate catalyst; vanadium phosphate iron aluminum chromium cation substitution oxygenated product; mesopore distribution pore partial oxidn catalyst trivalent cation substituted

IT Pore  
(mesopore, of Fe- and Cr- substituted; propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)

IT Oxidation  
(partial; propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)

IT Pore size distribution  
Surface area  
(propane partial oxidation over M3+-substituted vanadyl phosphates

- dispersed on titania and silica)
- IT Cations  
(trivalent; propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 167750-37-0, Iron **vanadium oxide phosphate**  
(Fe0.2V0.800.8(PO4)) 453547-19-8, Aluminum **vanadium oxide phosphate** (Al0.18V0.8200.82(PO4))  
RL: CAT (Catalyst use); USES (Uses)  
(dihydrate, precursor; propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 246226-81-3, Chromium iron **vanadium oxide phosphate** (Cr0.08Fe0.08V0.8400.84(PO4)) hydrate 453547-22-3  
RL: CAT (Catalyst use); USES (Uses)  
(precursor; propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 79-10-7P, Acrylic acid, preparation 107-02-8P, Acrolein, preparation  
RL: BYP (Byproduct); PREP (Preparation)  
(propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 12359-27-2, Vanadyl phosphate  
RL: CAT (Catalyst use); USES (Uses)  
(propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 67-64-1, Acetone, formation (nonpreparative) 74-85-1, Ethene, formation (nonpreparative) 124-38-9, Carbon dioxide, formation (nonpreparative) 630-08-0, Carbon monoxide, formation (nonpreparative)  
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)  
(propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 64-19-7P, Acetic acid, preparation 115-07-1P, Propene, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 74-98-6, Propane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 7631-86-9, **Silica**, uses 13463-67-7, **Titania**, uses  
RL: CAT (Catalyst use); USES (Uses)  
(support; propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)
- IT 12293-87-7, **Vanadium oxide phosphate** (VO(PO4)),

dihydrate

RL: CAT (Catalyst use); USES (Uses)

(undoped precursor; propane partial oxidation over M3+-substituted vanadyl phosphates dispersed on titania and silica)

OSC.G 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS RECORD (7 CITINGS)

RE.CNT 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 16 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2001:549476 HCAPLUS Full-text

DN 135:303468

TI Site isolation for light hydrocarbons oxidation

AU Volta, Jean-Claude

CS Institut de Recherches sur la Catalyse - CNRS, Villeurbanne, 69626, Fr.

SO Topics in Catalysis (2001), 15(2-4), 121-129

CODEN: TOCAFI; ISSN: 1022-5528

PB Kluwer Academic/Plenum Publishers

DT Journal; General Review

LA English

AB A review with refs. From consideration of several examples of catalytic oxide systems, it appears that the mild oxidation of light alkanes to oxygenates is controlled by the local properties of the surface of oxides which favor the isolation of the active cation or of a controlled number of active sites. This appears to be quite general on bulk mixed oxides as well as on supported oxides. Two examples are given for n-butane oxidation to maleic anhydride on the VPO catalyst and for ethane oxidation to acetic acid on the VPMoO/TiO<sub>2</sub> catalyst. This conclusion was reached by using several physicochem. techniques which are complementary and may distinguish the surface and the bulk properties of the catalytic oxides. As a consequence, the improvement of the performance of a catalytic oxide system and the discovery of new generation of catalysts will stem from the modification at short distance of the local environment of the active site.

CC 22-0 (Physical Organic Chemistry)

Section cross-reference(s): 35, 45, 67

ST site isolation hydrocarbon oxidn review; butane oxidn maleic anhydride vanadyl pyrophosphate review; ethane oxidn acetic acid vanadium phosphorus molybdenum oxide review

IT Oxidation

Oxidation catalysts

(Site isolation for light hydrocarbons oxidation)

IT Valence

(site isolation for light hydrocarbon oxidation)

IT Hydrocarbons, reactions

RL: PEP (Physical, engineering or chemical process); RCT (Reactant);  
 PROC (Process); RACT (Reactant or reagent)  
 (site isolation for light hydrocarbon oxidation)

IT Oxidation  
 (surface; Site isolation for light hydrocarbons oxidation)

IT Reaction mechanism  
 (surface; site isolation for light hydrocarbon oxidation)

IT 14542-94-0, Vanadium phosphate 25013-42-7,  
 Molybdenum phosphate 58834-75-6, Vanadyl pyrophosphate  
 RL: CAT (Catalyst use); PEP (Physical, engineering or chemical  
 process); PRP (Properties); RCT (Reactant); PROC (Process); RACT  
 (Reactant or reagent); USES (Uses)  
 (Site isolation for light hydrocarbons oxidation)

IT 74-84-0, Ethane, reactions 106-97-8, Butane, reactions  
 RL: PEP (Physical, engineering or chemical process); RCT (Reactant);  
 PROC (Process); RACT (Reactant or reagent)  
 (Site isolation for light hydrocarbons oxidation)

IT 64-19-7P, Acetic acid, preparation 108-31-6P, Maleic anhydride,  
 preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (Site isolation for light hydrocarbons oxidation)

IT 13463-67-7, Titania, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (anatase, catalyst support; Site isolation  
 for light hydrocarbons oxidation)

OSC.G 24 THERE ARE 24 CAPLUS RECORDS THAT CITE THIS RECORD (25  
 CITINGS)

RE.CNT 39 THERE ARE 39 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 17 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2000:741016 HCAPLUS Full-text

DN 133:282204

TI Redox process and catalysts for the dehydrogenation of a  
 hydrocarbon feed into an alkene

IN Stahl, Anni; Blom, Niels Jorgen; Perregaard, Jens; Nielsen, Poul  
 Erik Hojlund

PA Haldor Topsoe A/S, Den.

SO Eur. Pat. Appl., 6 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1044949	A1	20001018	EP 2000-105498	

					200003 15
				<--	
EP 1044949	B1	20040303			
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,					
PT, IE, SI, LT, LV, FI, RO					
DK 9900477	A	20001013	DK 1999-477		199904 12
				<--	
AT 260878	T	20040315	AT 2000-105498		200003 15
				<--	
ES 2216746	T3	20041101	ES 2000-105498		200003 15
				<--	
CA 2302074	A1	20001012	CA 2000-2302074		200003 27
				<--	
CA 2302074	C	20081216			
US 6326523	B1	20011204	US 2000-536582		200003 28
				<--	
AU 766556	B2	20031016	AU 2000-27629		200004 10
				<--	
NO 2000001874	A	20001013	NO 2000-1874		200004 11
				<--	
NO 326149	B1	20081006			
RU 2231517	C2	20040627	RU 2000-108719		200004 11
				<--	
JP 2000297048	A	20001024	JP 2000-110707		200004 12
				<--	
CN 1272481	A	20001108	CN 2000-106573		200004 12

CN 1179930 C 20041215  
 MX 2000003554 A 20020201 MX 2000-3554

200004  
 12

PRAI DK 1999-477 A 19990412 <--

# ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

- AB The dehydrogenation of a hydrocarbon feed into an alkene (e.g., propene) is achieved in high yield and selectivity by: dehydrogenating the hydrocarbon feed (e.g., propane); and removing hydrogen being formed by the dehydrogenation reactions. The dehydrogenation and hydrogen removal steps are performed simultaneously in the presence of a dehydrogenation catalyst (e.g., silica-coated **vanadium phosphate**) comprising a metal compound being reduced in the presence of hydrogen.
- IC ICM C07C005-42
- CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 23, 48, 67
- ST propane dehydrogenation propene manuf; propylene manuf propane dehydrogenation; **catalyst** dehydrogenation redox alkane conversion alkene
- IT Redox reaction **catalysts**  
 (dehydrogenative; metal oxides or phosphates in the dehydrogenation of a hydrocarbon feed into an alkene)
- IT Redox reaction  
 (in the dehydrogenation of a hydrocarbon feed into an alkene)
- IT Dehydrogenation **catalysts**  
 (metal oxides and phosphates for the dehydrogenation of a hydrocarbon into an alkene)
- IT Dehydrogenation  
 (of a hydrocarbon into an alkene)
- IT Oxides (inorganic), reactions  
 RL: CAT (Catalyst use); RCT (Reactant); RACT (Reactant or reagent);  
 USES (Uses)  
 (redox process and **catalysts** for the dehydrogenation of a hydrocarbon feed into an alkene)
- IT Hydrocarbons, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (redox process and **catalysts** for the dehydrogenation of a hydrocarbon into an alkene)
- IT 7664-38-2D, Phosphoric acid, redox-capable metal salts, reactions  
 RL: CAT (Catalyst use); RCT (Reactant); RACT (Reactant or reagent);  
 USES (Uses)  
 (**catalysts** for the dehydrogenation of a hydrocarbon feed into an alkene)
- IT 1333-74-0P, Hydrogen, preparation 11098-99-0P, Molybdenum oxide



14542-94-0P, Vanadium phosphate  
 RL: BYP (Byproduct); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (redox process and catalysts for the dehydrogenation of a hydrocarbon feed into an alkene)

IT 7440-47-3, Chromium, reactions  
 RL: CAT (Catalyst use); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)  
 (redox process and catalysts for the dehydrogenation of a hydrocarbon feed into an alkene)

IT 115-07-1P, Propene, preparation 115-11-7P, Isobutene, preparation  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
 (redox process and catalysts for the dehydrogenation of a hydrocarbon feed into an alkene)

IT 74-98-6, Propane, reactions 75-28-5, Isobutane  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (redox process and catalysts for the dehydrogenation of a hydrocarbon feed into an alkene)

IT 1344-28-1, Alumina, uses 7631-86-9, Silica, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (support; redox process and catalysts for the dehydrogenation of a hydrocarbon feed into an alkene)

OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 18 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2000:637981 HCAPLUS Full-text  
 DN 134:193763  
 TI Vanadium phosphate supported catalysts  
 for ethane oxidative dehydrogenation  
 AU Ciambelli, Paolo; Lisi, Luciana; Ruoppolo, Giovanna; Patrono, Pasquale; Galli, Paola; Pirone, Raffaele; Russo, Gennaro  
 CS Dipartimento di Ingegneria Chimica e Alimentare, Universita di Salerno, Fisciano, 84084, Italy  
 SO Phosphorus Research Bulletin (1999), 10, 424-429  
 CODEN: PREBE7; ISSN: 0918-4783  
 PB Japanese Association of Inorganic Phosphorus Chemistry  
 DT Journal  
 LA English  
 AB TiO<sub>2</sub>- and Al<sub>2</sub>O<sub>3</sub>-supported VOPO<sub>4</sub> was studied as catalyst for the oxidative dehydrogenation of ethane in the temperature range 450-550°C. The catalytic performances were dramatically enhanced with respect to bulk VOPO<sub>4</sub> as result of modified redox properties.

Catalytic activity and selectivity to ethylene are associated to the presence of reduced vanadium, whose formation occurs during the reaction and is favored by high temperature

CC 35-2 (Chemistry of Synthetic High Polymers)

ST vanadium phosphate catalyst ethane oxidative dehydrogenation; ethylene prepn catalyst vanadium phosphate; titania supported vanadium catalyst ethane dehydrogenation; alumina supported vanadium catalyst ethane dehydrogenation

IT Dehydrogenation catalysts (oxidative; alumina- and titania-supported vanadium phosphate catalyst for oxidative dehydrogenation of ethane)

IT 74-84-0, Ethane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent) (alumina- and titania-supported vanadium phosphate catalyst for oxidative dehydrogenation of ethane)

IT 74-85-1P, Ethylene, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation) (alumina- and titania-supported vanadium phosphate catalyst for oxidative dehydrogenation of ethane)

IT 12359-27-2, Vanadyl phosphate  
RL: CAT (Catalyst use); USES (Uses) (catalysts; alumina- and titania-supported vanadium phosphate catalyst for oxidative dehydrogenation of ethane)

IT 1344-28-1, Alumina, uses 13463-67-7, Titania, uses  
RL: CAT (Catalyst use); USES (Uses) (supports; alumina- and titania-supported vanadium phosphate catalyst for oxidative dehydrogenation of ethane)

OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

RE.CNT 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 19 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2000:584626 HCAPLUS Full-text

DN 133:350534

TI TiO2 supported vanadyl phosphate as catalyst for oxidative dehydrogenation of ethane to ethylene

AU Ciambelli, P.; Galli, P.; Lisi, L.; Massucci, M. A.; Patrono, P.; Pirone, R.; Ruoppolo, G.; Russo, G.

CS Dipartimento di Ingegneria Chimica e Alimentare, Universita di

- Salerno, Fisciano (SA), 84084, Italy
- SO Applied Catalysis, A: General (2000), 203(1), 133-142  
CODEN: ACAGE4; ISSN: 0926-860X
- PB Elsevier Science B.V.
- DT Journal
- LA English
- AB Bulk and TiO<sub>2</sub>-supported VOP<sub>4</sub> has been investigated for the oxidative dehydrogenation of ethane. XRD, SEM, and TG analyses and BET surface area measurements indicated that vanadyl phosphate is highly dispersed on the support up to monolayer coverage. A fraction of vanadium is present as V(IV) in the calcined samples as evaluated by EPR and TPR techniques. Both reducibility and acidity of vanadium phosphate is strongly enhanced by deposition on TiO<sub>2</sub> with respect to the bulk phase, as shown by TPR and NH<sub>3</sub> TPD technique, resp. The supported catalysts are active and selective in the oxidative dehydrogenation of ethane to ethylene in the temperature range 450-550°C, the monolayer catalyst giving the best performances. Ethylene selectivity decreases with increasing contact time but increases with temperature. The former effect indicates that ethylene is further oxidized to CO<sub>x</sub> at high contact times. The effect of the temperature was attributed to the formation of V(IV), favored at increasing temperature. This hypothesis was supported by TPR expts. carried out after catalytic tests at 550°C that indicated a significant increase of the fraction of V(IV) after the reaction.
- CC 35-2 (Chemistry of Synthetic High Polymers)  
Section cross-reference(s): 67
- ST ethane oxidative dehydrogenation ethylene prodn; vanadyl phosphate titania catalyst
- IT Dehydrogenation catalysts  
(oxidative; supported catalysts for oxidative dehydrogenation of ethane to ethene)
- IT 12293-87-7, Vanadyl phosphate dihydrate  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst for oxidative dehydrogenation of ethane to ethylene)
- IT 74-84-0, Ethane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalysts for oxidative dehydrogenation of ethane to ethylene)
- IT 13463-67-7, Titanium dioxide, uses  
RL: CAT (Catalyst use); USES (Uses)  
(support for catalyst for oxidative dehydrogenation of ethane to ethylene)
- IT 74-85-1, Ethylene, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(supported catalysts for oxidative dehydrogenation of ethane to)

OSC.G 30 THERE ARE 30 CAPLUS RECORDS THAT CITE THIS RECORD (30 CITINGS)

RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 20 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2000:565427 HCAPLUS Full-text

DN 134:117437

TI Molecular structure-reactivity relationships in n-butane oxidation over bulk VFO and supported vanadia catalysts: lessons for molecular engineering of new selective catalysts for alkane oxidation

AU Gulianti, V. V.; Benziger, J. B.; Sundaresan, S.; Wachs, I. E.  
CS Department of Chemical Engineering, University of Cincinnati, Cincinnati, OH, 45221-0171, USA

SO Studies in Surface Science and Catalysis (2000), 130B(International Congress on Catalysis, 2000, Pt. B), 1721-1726  
CODEN: SSCTDM; ISSN: 0167-2991

PB Elsevier Science B.V.

DT Journal

LA English

AB The promoter effects of ethanol, Si, Ti, Zr, V, and Nb on bulk vanadyl pyrophosphate, (VO<sub>2</sub>)P<sub>2</sub>O<sub>7</sub> (VFO) and supported vanadia catalysts were studied in partial oxidation of n-butane to maleic anhydride. The supported vanadia catalysts were prepared by the incipient-wetness impregnation of metal oxide supports (SiO<sub>2</sub>, TiO<sub>2</sub>, ZrO<sub>2</sub>, Nb<sub>2</sub>O<sub>3</sub>, and Al<sub>2</sub>O<sub>3</sub>) with vanadium isopropoxide solution in methanol. No correlation was found between the electronegativity of the promoter or oxide cation support and the catalytic activity and selectivity. Enhancement of the surface acidity had a beneficial effect on both the oxidation rate of n-butane and the selectivity toward maleic anhydride, over those of bulk VFO and supported vanadia catalysts. The activation of n-butane on both the bulk and supported vanadia catalysts requires both a redox site and an acid site. The supported vanadia catalysts represent a suitable model for bulk VFO catalysts.

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 67

ST vanadyl pyrophosphate catalyst silicon niobium promoter effect; butane partial oxidn vanadyl pyrophosphate catalyst selectivity; vanadia metal oxide supported catalyst surface acidity; maleic anhydride manuf butane oxidn vanadium catalyst

IT Impregnation

(incipient-wetness; promoter and support effects on surface acidity and selectivity of VFO and vanadia catalysts in n-butane oxidation to maleic anhydride)

- IT Catalyst supports  
Electronegativity  
Oxidation catalysts  
Oxidation kinetics  
Surface acidity  
(promoter and support effects on surface acidity and selectivity of VPO and vanadia catalysts in n-butane oxidation to maleic anhydride)
- IT 36139-34-1, Vanadium isopropoxide  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalyst precursor; promoter and support effects on surface acidity and selectivity of VPO and vanadia catalysts in n-butane oxidation to maleic anhydride)
- IT 1314-23-4, Zirconium oxide (ZrO2),  
uses 1344-28-1, Alumina, uses 7631-86-9,  
Silica, uses 12059-63-1, Niobium oxide (Nb2O3)  
13463-67-7, Titanium oxide (TiO2),  
uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst support; promoter and support effects on surface acidity and selectivity of VPO and vanadia catalysts in n-butane oxidation to maleic anhydride)
- IT 1314-62-1, Vanadia, uses 58834-75-6, Vanadium oxide pyrophosphate (VO2(P2O7))  
RL: CAT (Catalyst use); USES (Uses)  
(promoter and support effects on surface acidity and selectivity of VPO and vanadia catalysts in n-butane oxidation to maleic anhydride)
- IT 108-31-6P, Maleic anhydride, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(promoter and support effects on surface acidity and selectivity of VPO and vanadia catalysts in n-butane oxidation to maleic anhydride)
- IT 106-97-8, n-Butane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(promoter and support effects on surface acidity and selectivity of VPO and vanadia catalysts in n-butane oxidation to maleic anhydride)
- IT 64-17-5, Ethanol, uses 7440-03-1, Niobium, uses 7440-21-3,  
Silicon, uses 7440-32-6, Titanium, uses 7440-62-2, Vanadium,  
uses 7440-67-7, Zirconium, uses  
RL: CAT (Catalyst use); USES (Uses)  
(promoter; promoter and support effects on surface acidity and selectivity of VPO and vanadia catalysts in n-butane oxidation to maleic anhydride)
- OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1

## CITINGS)

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 21 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2000:114941 HCAPLUS Full-text

DN 132:295343

TI Investigation of sol-gel methods for the synthesis of VPO  
membrane materials adapted to the partial oxidation of n-butane

AU Farrusseng, D.; Julbe, A.; Lopez, M.; Guizard, C.

CS ENSCM, UMR CNRS 5635, Laboratoire des Matériaux et Procédés  
Membranaires, Montpellier, 34 296, Fr.

SO Catalysis Today (2000), 56(1-3), 211-220

CODEN: CATTEA; ISSN: 0920-5861

PB Elsevier Science B.V.

DT Journal

LA English

AB The sol-gel process was used to prepare supported vanadium phosphate (VPO) membranes adapted to the mild oxidation of n-butane to maleic anhydride in a membrane reactor. Starting from a vanadium oxoalkoxide, two different sol-gel methods have been investigated: the colloidal route in aqueous media and the polymeric route in organic media. The membrane synthesis as well as the characteristics of the VPO precursors are described on the basis of the fundamental phenomena occurring during the sol-gel process. The VPO precursors and the derived catalysts were characterized through TGA, elemental anal., LRS, XRD and N<sub>2</sub> adsorption-desorption. The polymeric route yielded an attractive hybrid organic-inorg. VPO precursor adapted to the synthesis of infiltrated VPO/ $\alpha$ -Al<sub>2</sub>O<sub>3</sub> composite membranes stable up to 500°C. N<sub>2</sub> permeation expts. were used to characterize the membranes after n-C<sub>4</sub>H<sub>10</sub> and O<sub>2</sub> heat-treatment cycles. Gravimetric anal. were useful to correlate the structural characteristics and permeation behavior of the VPO membranes after n-C<sub>4</sub>H<sub>10</sub> or O<sub>2</sub> treatments.

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 67

ST vanadyl phosphate alumina supported membrane butane oxidn maleic  
anhydride

IT Oxidation catalysts

(partial; sol-gel methods for the synthesis of vanadium  
phosphate membrane materials adapted to the partial  
oxidation of n-butane to maleic anhydride)

IT Permeability

(sol-gel methods for the synthesis of vanadium  
phosphate membrane materials adapted to the partial  
oxidation of n-butane to maleic anhydride)

IT Membranes, nonbiological

- (supported; sol-gel methods for the synthesis of vanadium phosphate membrane materials adapted to the partial oxidation of n-butane to maleic anhydride)
- IT 1344-28-1, Alumina, uses  
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
 (membrane support; sol-gel methods for the synthesis of vanadium phosphate membrane materials adapted to the partial oxidation of n-butane to maleic anhydride)
- IT 12359-27-2, Vanadyl phosphate (VOP04) 58834-75-6, Vanadyl pyrophosphate (VO)2P2O7  
 RL: CAT (Catalyst use); USES (Uses)  
 (sol-gel methods for the synthesis of vanadium phosphate membrane materials adapted to the partial oxidation of n-butane to maleic anhydride)
- IT 108-31-6P, 2,5-Furandione, preparation  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
 (sol-gel methods for the synthesis of vanadium phosphate membrane materials adapted to the partial oxidation of n-butane to maleic anhydride)
- IT 106-97-8, Butane, reactions 1804-93-9, Dipropyl phosphate 7664-38-2, Phosphoric acid, reactions 264921-17-7  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (sol-gel methods for the synthesis of vanadium phosphate membrane materials adapted to the partial oxidation of n-butane to maleic anhydride)
- OSC.G 6 THERE ARE 6 CAPLUS RECORDS THAT CITE THIS RECORD (6 CITINGS)
- L41 ANSWER 22 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1999:765441 HCAPLUS Full-text  
 DN 132:65695  
 TI Effect of promoters for n-butane oxidation to maleic anhydride over vanadium-phosphorus-oxide catalysts: comparison with supported vanadia catalysts  
 AU Guliants, V. V.; Benziger, J. B.; Sundaresan, S.; Wachs, I. E.; Hirt, A. M.  
 CS Department of Chemical Engineering, University of Cincinnati, Cincinnati, OH, 45221-0171, USA  
 SO Catalysis Letters (1999), 62(2-4), 87-91  
 CODEN: CALEER; ISSN: 1011-372X  
 PB Baltzer Science Publishers  
 DT Journal  
 LA English  
 AB The oxidation of n-butane to maleic anhydride was studied over model Nb-, Si-, Ti-, V-, and Zr-promoted bulk vanadium-phosphorus-oxide [VPO] and supported vanadia catalysts. The promoters were

concentrated in the surface region of the bulk VPO catalysts. For the supported vanadia catalysts, the vanadia phase was present as a two-dimensional metal oxide overlayer on the different oxide supports (TiO<sub>2</sub>, ZrO<sub>2</sub>, Nb<sub>2</sub>O<sub>5</sub>, Al<sub>2</sub>O<sub>3</sub>, and SiO<sub>2</sub>). No correlation was found between the electronegativity of the promoter or oxide support cation and the catalytic properties of these two catalytic systems. The maleic anhydride selectivity correlated with the Lewis acidity of the promoter cations and oxide supports. Both promoted bulk VPO and supported vanadia catalysts containing surface niobia species were the most active and selective to maleic anhydride. These findings suggest that the activation of n-butane on both the bulk and supported vanadia catalysts probably requires both surface redox and acid sites, and that the acidity also plays an important role in controlling further kinetic steps of n-butane oxidation

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 67

ST butane oxidn vanadium phosphorus oxide catalyst; vanadia catalyst butane oxidn metal oxide support; maleic anhydride manuf butane oxidn vanadia catalyst

IT Catalyst supports  
Electronegativity  
Lewis acidity  
Oxidation  
Oxidation catalysts

(effect of metal promoters on n-butane oxidation to maleic anhydride over vanadium-phosphorus-oxide catalysts)

IT 7440-03-1, Niobium, uses 7440-21-3, Silicon, uses 7440-32-6, Titanium, uses 7440-62-2, Vanadium, uses 7440-67-7, Zirconium, uses

RL: CAT (Catalyst use); USES (Uses)  
(catalyst promoter; effect of metal promoters on n-butane oxidation to maleic anhydride over vanadium-phosphorus-oxide catalysts)

IT 1313-96-8, Niobium oxide (Nb<sub>2</sub>O<sub>5</sub>) 1314-23-4, Zirconium oxide (ZrO<sub>2</sub>), uses 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 13463-67-7, Titanium oxide (TiO<sub>2</sub>), uses

RL: CAT (Catalyst use); USES (Uses)  
(catalyst support; effect of metal promoters on n-butane oxidation to maleic anhydride over vanadium-phosphorus-oxide catalysts)

IT 108-31-6P, Maleic anhydride, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)  
(effect of metal promoters on n-butane oxidation to maleic anhydride over vanadium-phosphorus-oxide catalysts)



IT 106-97-8, n-Butane, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (effect of metal promoters on n-butane oxidation to maleic anhydride over vanadium-phosphorus-oxide catalysts)

IT 1314-62-1, Vanadia, uses 65506-75-4, Vanadium phosphorus oxide  
 RL: CAT (Catalyst use); USES (Uses)  
 (oxidation catalyst; effect of metal promoters on n-butane oxidation to maleic anhydride over vanadium-phosphorus-oxide catalysts)

OSC.G 8 THERE ARE 8 CAPLUS RECORDS THAT CITE THIS RECORD (8 CITINGS)

RE.CNT 35 THERE ARE 35 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 23 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1999:750866 HCAPLUS Full-text  
 DN 132:24106  
 TI Sol-gel synthesis and catalytic properties of vanadium phosphates

AU Ennaciri, Sidi Abdelrazak; Malka, Karen; Louis, Catherine; Barboux, Philippe; R'Kha, Chakib; Livage, Jacques  
 CS Departement de Chimie, Universite Cadi Ayyad-Semlalia, Marrakech, Morocco

SO Catalysis Letters (1999), 62(1), 79-85  
 CODEN: CALEER; ISSN: 1011-372X

PB Baltzer Science Publishers  
 DT Journal  
 LA English

AB Vanadyl phosphates with variable sp. surface areas were prepared from V alkoxides and H3PO4 by precipitation in various solvents. The catalytic properties were studied for MeOH oxidation. Although the specific activity increases with sp. surface area, the intrinsic activities seem to depend on the particle morphol. The selectivities do not vary within a large range. The same method of precipitation was applied to prepare vanadyl phosphates on silica support. The supported phase is highly dispersed, and these supported catalysts are more stable than silica-supported V2O5.

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 67

ST methanol oxidn vanadyl phosphate catalyst; methyl formate prepn methanol oxidn catalyst

IT Oxidation catalysts  
 (catalytic properties of vanadyl phosphate catalysts for MeOH oxidation)

IT 61164-11-2, Vanadium oxide phosphate  
 RL: CAT (Catalyst use); USES (Uses)

(catalytic properties of vanadyl phosphate catalysts for MeOH oxidation)

IT 67-56-1, Methanol, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (catalytic properties of vanadyl phosphate catalysts for MeOH oxidation)

IT 107-31-3, Methyl formate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (catalytic properties of vanadyl phosphate catalysts for MeOH oxidation to)

OSC.G 5 THERE ARE 5 CAPLUS RECORDS THAT CITE THIS RECORD (5 CITINGS)

RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 24 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1999:460382 HCAPLUS Full-text  
 DN 131:89350  
 TI Production of formaldehyde using carbon oxides, hydrogen and hydrogen sulfide  
 IN Wachs, Israel E.  
 PA Lehigh University, USA  
 SO PCT Int. Appl., 41 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9933778	A1	19990708	WO 1998-US27411	19981223
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W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6084135	A	20000704	US 1998-216843	19981221
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CA 2316810	A1	19990708	CA 1998-2316810	

199812  
23

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AU 9919439                      A            19990719            AU 1999-19439                      199812  
23

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GB 2347929                      A            20000920            GB 2000-16227                      199812  
23

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GB 2347929                      B            20021231

PRAI US 1997-70113P            P            19971231            <--

WO 1998-US27411                W            19981223            <--

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB    A gas stream containing H, C oxide and H<sub>2</sub>S is (a) passed in contact with a **catalyst** comprising a porous alumina-supported sulfided metal selected from Mo, Cr, W, Mn, Ni, Fe, Zn, Co, Cu, Sn, V and mixts., optionally promoted by an alkali metal sulfide, to convert the H, C oxide and H<sub>2</sub>S to Me mercaptans, (primarily methanethiol, MeSH), and (b) the gas stream containing the Me mercaptans are passed in contact with a **catalyst** comprising a supported metal oxide or a bulk metal oxide in the presence of an oxidizing agent to convert at least a portion of the Me mercaptan to CH<sub>2</sub>O, and SO<sub>2</sub>. In step b, oxidation of MeSH over vanadia (1%) on titania **catalyst** at 150-450° to produce CH<sub>2</sub>O, showed maximum selectivity to CH<sub>2</sub>O at .apprx.400°.

IC    ICM C07C045-49

ICS C07C045-27; C07C045-32; C07C047-04; C07C319-02

CC    45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)

ST    formaldehyde prepn methyl mercaptan intermediate; hydrogen sulfide carbon oxide reaction mixt; transition metal sulfide **catalyst** mercaptan prepn; alkali metal sulfide **catalyst** mercaptan prepn; oxidn methyl mercaptan formaldehyde; metal oxide oxidn **catalyst** methanethiol

IT    Oxidation **catalysts**  
          (methanethiol oxidation in presence of supported)

IT    7446-09-5P, Sulfur dioxide, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
          (byproduct; methanethiol oxidation in presence of metal oxide)

IT    229620-63-7, Bismuth iron molybdenum oxide (Bi<sub>3</sub>FeMo<sub>3</sub>O<sub>16</sub>)  
RL: CAT (Catalyst use); USES (Uses)  
          (ceramic; methanethiol oxidation in presence of supported)

IT    50-00-0P, Formaldehyde, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
          (methanethiol oxidation in presence of metal oxide)

IT    74-93-1, Methanethiol, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)

(methanethiol oxidation in presence of metal oxide)

IT 1313-13-9, Manganese oxide (MnO<sub>2</sub>), uses 1317-34-6, Manganese oxide (Mn<sub>2</sub>O<sub>3</sub>) 1317-35-7, Manganese oxide (Mn<sub>3</sub>O<sub>4</sub>) 1344-43-0, Manganous oxide, uses 7631-95-0, Sodium molybdate (Na<sub>2</sub>MoO<sub>4</sub>) 7722-64-7, Potassium permanganate 7775-11-3, Sodium chromate (Na<sub>2</sub>CrO<sub>4</sub>) 7778-50-9, Potassium dichromate (K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>) 7787-42-0, Barium tungstate (BaWO<sub>4</sub>) 7789-00-6 7789-82-4, Calcium molybdate (CaMoO<sub>4</sub>) 7790-60-5, Potassium tungstate (K<sub>2</sub>WO<sub>4</sub>) 7790-75-2, Calcium tungstate (CaWO<sub>4</sub>) 10099-79-3, Lead vanadium oxide (PbV<sub>2</sub>O<sub>6</sub>) 10101-58-3, Cobalt tungsten oxide (CoWO<sub>4</sub>) 10190-55-3, Lead molybdenum oxide (PbMoO<sub>4</sub>) 10294-52-7, Iron chromate (Fe<sub>2</sub>(CrO<sub>4</sub>)<sub>3</sub>) 10588-01-9 12009-63-1, Barium titanate (BaTiO<sub>4</sub>) 12013-45-5, Calcium niobium oxide CaNb<sub>2</sub>O<sub>6</sub> 12030-85-2, Potassium niobate (KNbO<sub>3</sub>) 12031-11-7, Potassium niobium oxide K<sub>8</sub>Nb<sub>6</sub>O<sub>19</sub> 12031-63-9, Lithium niobate (LiNbO<sub>3</sub>) 12034-09-2, Sodium niobate (NaNbO<sub>3</sub>) 12034-34-3, Sodium titanate (Na<sub>2</sub>TiO<sub>3</sub>) 12034-61-6, Niobium yttrium oxide (NbYO<sub>4</sub>) 12034-62-7, Niobium ytterbium oxide (NbYbO<sub>4</sub>) 12047-27-7, Barium titanate (BaTiO<sub>3</sub>), uses 12068-52-9, Aluminum manganese oxide (Al<sub>2</sub>MnO<sub>4</sub>) 12142-45-9, Potassium niobate (K<sub>4</sub>Nb<sub>6</sub>O<sub>17</sub>) 12258-25-2, Aluminum niobium oxide AlNbO<sub>4</sub> 12272-28-5, Bismuth niobium oxide (BiNbO<sub>4</sub>) 12359-27-2, Vanadium oxide phosphate (VO(PO<sub>4</sub>)) 12422-53-6, Potassium chromate K<sub>2</sub>Cr<sub>4</sub>O<sub>13</sub> 12436-50-9, Iron tungstate (Fe<sub>2</sub>(WO<sub>4</sub>)<sub>3</sub>) 13451-05-3, Strontium tungstate (SrWO<sub>4</sub>) 13454-78-9, Cesium chromate (Cs<sub>2</sub>CrO<sub>4</sub>) 13466-16-5, Sodium molybdate (Na<sub>2</sub>MoO<sub>4</sub>) 13472-33-8, Sodium perhenate 13472-45-2 13530-56-8, Aluminum vanadium oxide (AlVO<sub>4</sub>) 13568-45-1, Lithium tungstate (Li<sub>2</sub>WO<sub>4</sub>) 13568-63-3, Magnesium vanadate (Mg<sub>2</sub>V<sub>2</sub>O<sub>7</sub>) 13568-68-8, Magnesium vanadate (Mg<sub>3</sub>(VO<sub>4</sub>)<sub>2</sub>) 13587-19-4, Cesium tungstate (Cs<sub>2</sub>WO<sub>4</sub>) 13587-35-4, Copper tungsten oxide (CuWO<sub>4</sub>) 13597-19-8, Cerium vanadium oxide (CeVO<sub>4</sub>) 13718-26-8, Sodium vanadate (NaVO<sub>3</sub>) 13721-35-2, Sodium tungstate (Na<sub>2</sub>W<sub>2</sub>O<sub>7</sub>) 13721-39-6, Sodium vanadate (Na<sub>3</sub>VO<sub>4</sub>) 13762-14-6, Cobalt molybdenum oxide (CoMoO<sub>4</sub>) 13765-19-0, Calcium chromate (CaCrO<sub>4</sub>) 13767-03-8, Magnesium molybdate (MgMoO<sub>4</sub>) 13767-34-5, Copper molybdenum oxide (CuMoO<sub>4</sub>) 13768-48-4, Lithium rhenium oxide (LiReO<sub>4</sub>) 13768-50-8, Magnesium rhenate (Mg(ReO<sub>4</sub>)<sub>2</sub>) 13769-43-2, Potassium vanadate (KVO<sub>3</sub>) 13870-24-1, Iron tungsten oxide (FeWO<sub>4</sub>) 13977-56-5, Iron vanadium oxide (FeVO<sub>4</sub>) 14013-15-1, Manganese molybdenum oxide (MnMoO<sub>4</sub>) 14059-33-7, Bismuth vanadium oxide (BiVO<sub>4</sub>) 14177-46-9, Manganese tungsten oxide MnWO<sub>4</sub> 14177-51-6, Nickel tungsten oxide NiWO<sub>4</sub> 14177-55-0, Nickel molybdenum oxide NiMoO<sub>4</sub> 14929-64-7, Sodium chromate (Na<sub>2</sub>Cr<sub>4</sub>O<sub>13</sub>) 14985-14-9, Gadolinium molybdate (Gd<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>) 15123-80-5, Aluminum molybdate Al<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub> 15123-82-7, Aluminum tungstate (Al<sub>2</sub>(WO<sub>4</sub>)<sub>3</sub>) 15469-60-0, Zinc vanadate (Zn<sub>3</sub>(VO<sub>4</sub>)<sub>2</sub>) 15578-31-1, Vanadium zinc oxide (V<sub>2</sub>Zn<sub>2</sub>O<sub>7</sub>) 15586-37-5, Chromium molybdate (Cr<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>) 15593-35-8, Niobium oxide phosphate

(NbO(PO<sub>4</sub>)) 15971-52-5, Potassium chromate (K<sub>2</sub>Cr<sub>3</sub>O<sub>10</sub>) 16229-40-6, Bismuth molybdenum oxide (Bi<sub>2</sub>Mo<sub>2</sub>O<sub>9</sub>) 16872-61-0, Lead vanadium oxide (Pb<sub>2</sub>V<sub>2</sub>O<sub>7</sub>) 17622-84-3, Cadmium vanadate (Cd<sub>2</sub>V<sub>2</sub>O<sub>7</sub>) 19402-39-2, Lithium tungstate (Li<sub>6</sub>WO<sub>6</sub>) 22470-36-6, Thallium vanadium oxide (TlVO<sub>4</sub>) 29992-43-6, Cesium lutetium tungsten oxide CsLuW<sub>2</sub>O<sub>8</sub> 35600-19-2, Antimony niobium oxide (SbNbO<sub>4</sub>) 55127-58-7, Molybdenum tellurium oxide (MoTe<sub>2</sub>O<sub>7</sub>) 80487-87-2, Calcium niobium potassium oxide (Ca<sub>2</sub>Nb<sub>3</sub>KO<sub>10</sub>) 100154-26-5, Sodium chromate (Na<sub>2</sub>Cr<sub>3</sub>O<sub>10</sub>) 222834-02-8, Bismuth tungsten oxide (BiW<sub>4</sub>O<sub>4</sub>) 222834-06-2, Bismuth chromium oxide (BiCrO<sub>4</sub>) 223650-70-2  
 RL: CAT (Catalyst use); USES (Uses)  
 (methanethiol oxidation in presence of supported)  
 IT 1344-28-1, **Alumina**, uses 7631-86-9, **Silica**,  
 uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (support; methanethiol oxidation in presence of)  
 IT 1313-27-5, Molybdenum trioxide, uses 1313-96-8, Niobium oxide (Nb<sub>2</sub>O<sub>5</sub>) 1314-23-4, **Zirconia**, uses 1314-35-8, Tungsten oxide WO<sub>3</sub>, uses 13463-67-7, **Titania**, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (supported and support; methanethiol oxidation in presence of)  
 IT 1308-38-9, Chromia, uses 1314-61-0, Tantalum oxide 1314-62-1, Vanadia, uses 1314-68-7, Rhenium oxide Re<sub>2</sub>O<sub>7</sub> 11129-60-5, Manganese oxide 13769-81-8, Iron molybdate Fe<sub>2</sub>(MoO<sub>4</sub>)<sub>3</sub>  
 RL: CAT (Catalyst use); USES (Uses)  
 (supported; methanethiol oxidation in presence of)  
 OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)  
 RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT  
 L41 ANSWER 25 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1998:802746 HCAPLUS Full-text  
 DN 130:125425  
 TI The selective oxidation of n-butane to maleic anhydride: comparison of bulk and supported V-P-O **catalysts**  
 AU Ruitenbeek, M.; Van Dillen, A. J.; Barbon, A.; Van Faassen, E. E.; Koningsberger, D. C.; Geus, J. W.  
 CS Debye Institute, Department of Inorganic Chemistry and Catalysis, Utrecht University, Utrecht, 3508 TB, Neth.  
 SO Catalysis Letters (1998), 55(3,4), 133-139  
 CODEN: CALEER; ISSN: 1011-372X  
 PB Baltzer Science Publishers  
 DT Journal  
 LA English

- AB V-P-O catalysts supported on the surface of silica and titania particles were studied and compared with bulk V-P-O. The catalytic performance was tested in the n-butane oxidation reaction to maleic anhydride, and the structure of the equilibrated catalysts was characterized with X-ray absorption spectroscopy (EXAFS) and (low-temperature) ESR spectroscopy. Our results show considerable differences in catalytic performance between VPO/TiO<sub>2</sub> on the one hand, and VPO/SiO<sub>2</sub> and VPO/bulk on the other hand, the yield to maleic anhydride being comparable for VPO/bulk and VPO/SiO<sub>2</sub>. The differences in catalytic behavior are attributed to differences in the local structure around vanadium (EXAFS). Furthermore, different spin exchange interactions between vanadium atoms in the three samples have been observed (ESR). The combination of characterization methods suggests that the structure of the supported V-P-O phase is amorphous and differs considerably from that of bulk crystalline vanadylpyrophosphate. We therefore propose that the oxidation of n-butane to maleic anhydride takes place over an amorphous surface V-P-O phase. This finding has high relevance for our understanding of the catalytic activity of bulk crystalline V-P-O catalysts as well.
- CC 35-2 (Chemistry of Synthetic High Polymers)
- ST oxidn catalyst butane maleic anhydride; silica  
oxidn catalyst support butane; titania  
oxidn catalyst support butane; vanadium oxidn  
catalyst butane; phosphorus oxidn catalyst butane
- IT Oxidation catalysts  
(selective; selective oxidation of butane to maleic anhydride on  
bulk and supported V-P-O catalysts)
- IT 65506-75-4, Vanadium phosphorus oxide  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts; selective oxidation of butane to maleic  
anhydride on bulk and supported V-P-O catalysts)
- IT 106-97-8, n-Butane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(selective oxidation of butane to maleic anhydride on bulk and  
supported V-P-O catalysts)
- IT 108-31-6P, Maleic anhydride, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(selective oxidation of butane to maleic anhydride on bulk and  
supported V-P-O catalysts)
- IT 7631-86-9, Silica, uses  
RL: CAT (Catalyst use); USES (Uses)  
(supports, C 500-20; selective oxidation of butane to  
maleic anhydride on bulk and supported V-P-O catalysts)
- IT 13463-67-7, P 25, uses  
RL: CAT (Catalyst use); USES (Uses)  
(supports; selective oxidation of butane to maleic anhydride on

bulk

and supported V-P-O catalysts)

OSC.G 13 THERE ARE 13 CAPLUS RECORDS THAT CITE THIS RECORD (13 CITINGS)

RE.CNT 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 26 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 1998:665476 HCAPLUS Full-text

DN 129:266039

OREF 129:54135a

TI Effects of silica and titania supports  
on catalytic performance of vanadium-phosphorus-oxide  
catalysts

AU Ruitenbeek, M.; Van Dillen, A. J.; Koningsberger, D. C.; Geus, J. W.  
CS Debye Institute, Department of Inorganic Chemistry, Utrecht  
University, Utrecht, 3508 TB, Neth.

SO Studies in Surface Science and Catalysis (1998),  
118(Preparation of Catalysts VII), 549-556  
CODEN: SSCTDM; ISSN: 0167-2991

PB Elsevier Science B.V.

DT Journal

LA English

AB Silica - and titania-supported V-P-O catalysts (.apprx.8 weight% V)  
were prepared by means of homogeneous deposition precipitation and  
compared with an "organic" bulk V-P-O catalyst. All samples were  
tested in the selective oxidation of n-butane to maleic anhydride  
(MA), and characterized with X-ray absorption spectroscopy (EXAFS).  
The catalytic performance of VPO/TiO2 on the one hand and VPO/SiO2  
and VPO/bulk on the other hand is remarkably different. EXAFS data  
anal. revealed that these differences can be explained by structural  
differences between the V-P-O phases in the different catalysts.  
However, VPO/SiO2 and VPO/bulk, which display comparable yields to  
MA, show a different EXAFS spectrum. This indicates that the active  
phase in this reaction is not vanadylpyrophosphate.

CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction  
Mechanisms)

Section cross-reference(s): 23, 35, 45  
ST silica support vanadium phosphorus oxide  
catalyst; butane oxidn vanadium phosphorus oxide  
catalyst; titania support vanadium  
phosphorus oxide catalyst; maleic anhydride synthesis  
vanadium phosphorus oxide

IT Catalyst supports

Oxidation catalysts

(effects of silica and titania  
supports on catalytic performance of

vanadium-phosphorus-oxide catalysts)

IT 7631-86-9, Silica, uses 13463-67-7, Titania, uses 65506-75-4, Phosphorus vanadium oxide  
 RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
 (effects of silica and titania  
 supports on catalytic performance of  
 vanadium-phosphorus-oxide catalysts)

IT 106-97-8, Butane, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (effects of silica and titania  
 supports on catalytic performance of  
 vanadium-phosphorus-oxide catalysts)

IT 108-31-6P, Maleic anhydride, preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (effects of silica and titania  
 supports on catalytic performance of  
 vanadium-phosphorus-oxide catalysts)

OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2  
 CITINGS)

RE.CNT 28 THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 27 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1998:461460 HCAPLUS Full-text  
 DN 129:207708  
 OREF 129:42087a,42090a

TI Supported VPO catalysts for selective oxidation  
 of butane. III. Effect of preparation procedure and SiO2  
 support

AU Bueno, J. M. C.; Bethke, G. K.; Kung, M. C.; Kung, H. H.  
 CS DEQ/UFSCar, Sao Carlos, 13560, Brazil  
 SO Catalysis Today (1998), 43(1-2), 101-110  
 CODEN: CATTEA; ISSN: 0920-5861

PB Elsevier Science B.V.  
 DT Journal  
 LA English

AB The effects of the nature of silica support and removal of soluble  
 vanadium species by ethanol on the catalytic properties of silica-  
 supported VPO catalysts were investigated. Ethanol preferentially  
 removes V+5 species. For a silica-supported sample of P/V ratio much  
 lower than two, ethanol treatment resulted in a sample of higher P/V  
 ratio and higher selectivity for maleic anhydride in butane oxidation  
 The crystalline VPO phases formed differed on a hydrophobic vs.  
 hydrophilic silica. (VO)2P2O7 could be formed more easily on the  
 former support. Interestingly, for all silica-supported catalysts,  
 the maleic anhydride selectivity depended much more strongly on the



P/V ratio than on the method of preparation, the nature of the silica, or the crystalline VPO phase present.

CC 67-2 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)

ST Section cross-reference(s): 23, 35, 45  
maleic anhydride synthesis phosphorus vanadium oxide; butane oxidn  
VPO catalyst silica support;  
vanadyl diphosphate silica catalyst butane oxidn

IT Catalyst supports  
Oxidation catalysts  
(supported VPO catalysts for selective oxidation  
of butane and effect of preparation procedure and SiO2 support)

IT 7631-86-9, Silica, uses 58834-75-6, Vanadyl diphosphate  
65506-75-4, Phosphorus vanadium oxide  
RL: CAT (Catalyst use); USES (Uses)  
(supported VPO catalysts for selective oxidation  
of butane and effect of preparation procedure and SiO2 support)

IT 64-17-5, Ethanol, properties  
RL: PEP (Physical, engineering or chemical process); PRP  
(Properties); PROC (Process)  
(supported VPO catalysts for selective oxidation  
of butane and effect of preparation procedure and SiO2 support)

IT 106-97-8, Butane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(supported VPO catalysts for selective oxidation  
of butane and effect of preparation procedure and SiO2 support)

IT 108-31-6P, Maleic anhydride, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(supported VPO catalysts for selective oxidation  
of butane and effect of preparation procedure and SiO2 support)

OSC.G 13 THERE ARE 13 CAPLUS RECORDS THAT CITE THIS RECORD (13 CITINGS)

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 28 OF 32 HCAPLUS COPYRIGHT 2010 ACS ON STN  
AN 1998:188289 HCAPLUS Full-text  
DN 128:232566  
OREF 128:46009a, 46012a

TI Catalytic activity in partial oxidation of methane and  
physico-chemical characterization of a VPO system obtained  
from boiler ash

AU Alemany, Luis J.; Larrubia, Maria A.; Blasco, Jose M.  
 CS Departamento de Ingenieria Quimica. Facultad de Ciencias,  
 Universidad de Malaga, Malaga, E-29071, Spain  
 SO Applied Catalysis, B: Environmental (1998), 16(2), 139-147  
 CODEN: ACBEE3; ISSN: 0926-3373  
 PB Elsevier Science B.V.  
 DT Journal  
 LA English  
 AB Bottom ash from the combustion of fossil fuels contain a higher  
 amount of vanadium. The recovery and the precipitation could be an  
 attractive route for the synthesis of a catalytic system (VFO). The  
 morphol. and structure of the precursor and the final systems,  
 calcined at different temps., obtained using bottom ash as raw  
 material, have been assessed using different techniques. Both VFO-  
 bulk system and supported on different silicas have been tested in  
 the partial methane oxidation. The exptl. results are comparable to  
 those reported for catalyst systems and performed in similar  
 conditions. The reactivity appears to be essentially related with  
 the exposed sites and the contribution of catalyst surface.

CC 51-11 (Fossil Fuels, Derivatives, and Related Products)  
 Section cross-reference(s): 45, 67

ST methane partial oxidn catalyst boiler ash; hydrocarbon  
 oxygenate synthesis methane partial oxidn

IT Hydrocarbons, preparation  
 RL: PNU (Preparation, unclassified); PREP (Preparation)  
 (C>1; boiler ash-derived catalysts for partial oxidation  
 of methane)

IT Hydrocarbons, preparation  
 RL: PNU (Preparation, unclassified); PREP (Preparation)  
 (C2; boiler ash-derived catalysts for partial oxidation of  
 methane)

IT IR spectra  
 Raman spectra  
 X-ray diffraction  
 (boiler ash-derived VFO catalysts for partial  
 oxidation of methane)

IT Oxidation catalysts  
 (boiler ash-derived catalysts for partial oxidation of  
 methane)

IT Ashes (residues)  
 (fuel-oil; boiler ash-derived catalysts for partial  
 oxidation of methane)

IT 7440-62-2, Vanadium, uses 7723-14-0, Phosphorus, uses  
 RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
 (boiler ash-derived VFO catalysts for partial  
 oxidation of methane)

IT 74-82-8, Methane, processes

RL: PEP (Physical, engineering or chemical process); PROC (Process)  
 (boiler ash-derived **catalysts** for partial oxidation of)

IT 124-38-9, Carbon dioxide, formation (nonpreparative)  
 RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)  
 (boiler ash-derived **catalysts** for partial oxidation of methane)

IT 50-00-0P, Formaldehyde, preparation 67-56-1P, Methanol, preparation 630-08-0P, Carbon monoxide, preparation  
 RL: PNU (Preparation, unclassified); PREP (Preparation)  
 (boiler ash-derived **catalysts** for partial oxidation of methane)

IT 7631-86-9, Silica, uses  
 RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
 (**catalyst supports**; boiler ash-derived **VPO catalysts** for partial oxidation of methane)

OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

RE.CNT 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 29 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1991:688167 HCAPLUS Full-text  
 DN 115:288167  
 OREF 115:48787a,48790a

TI Nature of the structures formed upon fixation of vanadium and phosphorus on silica surface

AU Zazhigalov, V. A.; Belousov, V. M.; Bacherikova, I. V.; Zaitsev, Yu. P.

CS Inst. Fiz. Khim. im. Pisarzhevskogo, Kiev, USSR  
 SO Teoreticheskaya i Eksperimental'naya Khimiya (1991), 27(3), 370-5  
 CODEN: TEKHA4; ISSN: 0497-2627

DT Journal  
 LA Russian

AB The V-P/SiO2 **catalysts** obtained by impregnation and grafting with different amount of V and P were studied by ESR, SEM, and EXAFS. Irresp. of the synthesis method, V concentration, or P/V ratio, regions of the crystalline phase  $\beta$ -VOPO4 with low concns. of V4+ ions exist on the support surface.

CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)

ST vanadium phosphorus silica **catalyst** prepn; surface compn structure vanadium phosphorus **catalyst**

IT **Catalysts and Catalysis**  
 (vanadium-phosphorus-silica, prepared by grafting or impregnation, surface composition and structure on)

IT 7440-62-2, Vanadium, uses and miscellaneous

RL: CAT (Catalyst use); USES (Uses)  
 (catalyst, with phosphorus on silica  
 support, surface composition and structure of)  
 IT 7723-14-0, Phosphorus, uses and miscellaneous  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst, with vanadium on silica  
 support, surface composition and structure of)  
 IT 12359-27-2, Vanadium oxide phosphate (VOPO4)  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (catalysts with surface phases of, on silica  
 supports)  
 OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2  
 CITINGS)

L41 ANSWER 30 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 1991:586370 HCAPLUS Full-text

DN 115:186370

OREF 115:31805a,31808a

TI Selective oxidation of carbon monoxide in a mixture

IN Bonifaz, Christobal; Corbin, David R.

PA du Pont de Nemours, E. I., and Co., USA

SO U.S., 6 pp.

CODEN: USXXAM

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	US 5045297	A	19910903	US 1989-341859	198903 31

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PRAI US 1989-341859

19890331 <--

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The process comprises contacting the CO and the hydrocarbon and/or  
 partially oxidized hydrocarbon mixture containing C4H10 and maleic  
 anhydride with a catalyst comprising Pd or Pt metal loaded on a  
 support selected from SiO2 or a SiO2 containing V phosphate at 350-  
 450° in the presence of O.

IC ICM C01B031-20

INCL 423437000

CC 49-10 (Industrial Inorganic Chemicals)

ST carbon monoxide oxidn platinum catalyst; palladium

catalyst carbon monoxide oxidn; silica

catalyst support carbon monoxide oxidn;

vanadium phosphate silica

catalyst support; butane mixt carbon monoxide  
selective oxidn; maleic anhydride mixt carbon monoxide oxidn

IT 1343-98-2, Silicic acid  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst support, for selective oxidation of carbon  
monoxide in hydrocarbon mixture)

IT 7440-05-3, Palladium, uses and miscellaneous 7440-06-4, Platinum,  
uses and miscellaneous  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, on silica support, for  
selective oxidation of carbon monoxide in hydrocarbon mixture)

IT 106-97-8, Butane, reactions 108-31-6, Maleic anhydride, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(hydrocarbon mixture containing, selective oxidation of carbon  
monoxide  
in, platinum and palladium catalysts on silica  
support for)

IT 1314-62-1, Vanadium pentoxide, uses and miscellaneous 7664-38-2,  
Phosphoric acid, uses and miscellaneous  
RL: USES (Uses)  
(polysilicic acid treated with, for catalyst support,  
for selective oxidation of carbon monoxide in hydrocarbon mixture)

IT 630-08-0, Carbon monoxide, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(selective oxidation of, in hydrocarbon mixture, palladium and  
platinum catalyst on silica support  
for)

OSC.G 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD (4  
CITINGS)

RE.CNT 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 31 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 1984:491475 HCAPLUS Full-text  
DN 101:91475  
OREF 101:14044a  
TI Oxidation of 1,3-pentadiene to maleic anhydride  
AU Belostotskaya, I. L.; Glukhovskii, N. G.; Saratova, S. D.;  
Klionskaya, E. A.  
CS Vses. Nauchno-Issled. Inst. Neftekhim. Protsessov, Leningrad, USSR  
SO Neftekhimiya (1984), 24(3), 399-403  
CODEN: NEFTAH; ISSN: 0028-2421  
DT Journal  
LA Russian  
AB Maleic anhydride (I) [108-31-6] was prepared by oxidation of 1,3-  
pentadiene [504-60-9] (a mixture of cis and trans isomers, 95%  
purity) in the presence of a V-P catalyst on silica gel (and in 1

case without the silica gel support), and the yield and selectivity of the reaction were determined as function of sp. surface and active substance content of the catalyst. The yield of I reached 72 mol% in the presence of catalyst containing .apprx.26% active substance and having sp. surface .apprx.20 m<sup>2</sup>/g. The catalysts were prepared by impregnation of silica gel with vanadium phosphate, and drying and calcining the product in air at 480°. The V2O5-P2O5 mol ratio of the catalyst was 1:1.2, and the active substance content and sp. surface ranges were 12.9-100.0% and 3.9-38.0 m<sup>2</sup>/g, resp.

CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 23  
 ST pentadiene oxidn maleic anhydride; piperylene oxidn maleic anhydride; vanadium phosphorus oxidn catalyst  
 IT Oxidation  
     (of piperylene to maleic anhydride)  
 IT Oxidation catalysts  
     (vanadium-phosphorus on silica gel, for piperylene to maleic anhydride)  
 IT 14542-94-0  
 RL: CAT (Catalyst use); USES (Uses)  
     (catalysts, for oxidation of piperylene to maleic anhydride)  
 IT 504-60-9  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
     (oxidation of, to maleic anhydride, vanadium-phosphorus oxide catalysts for)  
 IT 108-31-6P, preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
     (preparation of, by oxidation of piperylene, vanadium-phosphorus oxide catalysts for)

L41 ANSWER 32 OF 32 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1964:67861 HCAPLUS Full-text  
 DN 60:67861  
 OREF 60:11902g-h,11903a  
 TI Maleic anhydride by vapor-phase oxidation of butene  
 IN Skinner, Wilfred A.; Tieszen, Dale O.  
 PA Petro-Tex Chemical Corp.  
 SO 12 pp.  
 DT Patent  
 LA Unavailable  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	FR 1345558		19631213	FR 1961-873499	

&lt;--

GB 993415 GB  
 PRAI US 19600919 <--  
 AB A catalyst containing Mo, V, and P, on a silica gel support prepared by hydrolysis of (EtO)<sub>4</sub>Si (I) was effective in the title process. Thus, 121 ml. I was heated 1 hr. on a steam bath with 61 ml. EtOH and 43 ml. H<sub>2</sub>O, the silica gel thus formed washed with H<sub>2</sub>O and added to a solution of 41 g. (NH<sub>4</sub>)<sub>6</sub>Mo<sub>7</sub>O<sub>24</sub>·4H<sub>2</sub>O, 9 g. NH<sub>4</sub>VO<sub>3</sub>, and 1.7 ml. 85% H<sub>3</sub>PO<sub>4</sub> in 250 ml. H<sub>2</sub>O, the whole heated to dryness, pressed into .apprx.3 mm. + 3 mm. tablets, and activated 18 hrs. at 400-70° in a current of 400 ml. air/min. A mixture of 20 ml. 2-butene plus 2000 ml. air/min. was passed over the catalyst at 310-15°, contact time 1.5 sec. The exit gas contained 55% maleic acid, and 78% total acids yields (based on butene).

IC C07C  
 CC 33 (Aliphatic Compounds)  
 IT Pumice  
     (catalysts from Mo, V oxide and, in oxidation of benzene)  
 IT Anhydrides  
     (dicarboxylic)  
 IT Catalysts and Catalysis  
     (in oxidation, of 2-butene, Mo V phosphate silicate as)  
 IT Catalysts and Catalysis  
     (in oxidation, of benzene, Mo V oxide on pumice as)  
 IT Oxidation  
     (of 1-butene (liquid) in presence of 2-butene maleic anhydride by)  
 IT Oxidation  
     (of benzene, maleic anhydride by)  
 IT Molybdenum vanadium oxide, V<sub>6</sub>Mo<sub>4</sub>O<sub>25</sub>  
     (catalyst from pumice and, in oxidation of benzene)  
 IT Molybdenum vanadium phosphate silicate  
     (catalyst in oxidation of 2-butene)  
 IT Vanadium molybdenum phosphate silicate  
     (catalyst, in oxidation of 2-butene)  
 IT Vanadium molybdenum oxide  
     (catalysts from pumice and, in oxidation of benzene)  
 IT 108-31-6P, Maleic anhydride  
 RL: PREP (Preparation)  
     (manufacture of, from 2-butene)  
 IT 108-31-6P, Maleic anhydride  
 RL: PREP (Preparation)  
     (manufacture of, from benzene)  
 IT 71-43-2, Benzene 107-01-7, 2-Butene  
     (oxidation of, to maleic anhydride)

=> d 144 1-20 bib abs hitind

L44 ANSWER 1 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2006:800232 HCAPLUS Full-text  
 DN 145:213024  
 TI An improved process for the preparation of cyanopyridines  
 IN Farsinavis, Suresh; Rao, Panja Kanta; Rao, Alla Venkat Rama;  
 Kulkarni, Shivanand Janardan; Rao, Revur Ramachandra; Subrahmanyam,  
 Machiraju  
 PA Council of Scientific and Industrial Research, India  
 SO Indian, 9 pp.  
 CODEN: INXXAP  
 DT Patent  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	IN 190431	A1	20030726	IN 1995-DE955	199505 25

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PRAI IN 1995-DE955 19950525 <--  
 OS CASREACT 145:213024  
 AB Title process comprises the steps of: passing a feed consisting of 3-picoline or 4-picoline and ammonia in a molar ratio ranging from 1:1 to 1:20, water and air/oxygen ranging from 30 cc per min. to 100 cc per min. over a **vanadium -silico-alumino-phosphate (VSAPO) catalyst** prepared by the process such as herein described at a temperature in the range of 300-450°C and weight hourly space velocity of liquid feed products in the range of 0.25 to 1.0 per h, recovering the cyanopyridines by conventional methods.  
 IC ICM C07C121-00  
 CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 67  
 ST cyanopyridine picoline ammonia **vanadium silico alumino phosphate VSAPO**  
 IT Ammoxidation  
 Ammoxidation **catalysts**  
 (preparation of cyanopyridines from picolines using **vanadium -silico-alumino-phosphate ammoxidn. catalysts**  
 )  
 IT Silicoaluminophosphate zeolites  
 RL: CAT (Catalyst use); USES (Uses)  
 (vanadium-containing, VSAPO; preparation of cyanopyridines from



## picolines

using vanadium-silico-alumino-phosphate  
ammoxidn. catalysts)

- IT 100-48-1P, 4-Pyridinecarbonitrile 100-54-9P, 3-Cyanopyridine  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(preparation of cyanopyridines from picolines using vanadium  
-silico-alumino-phosphate ammoxidn. catalysts  
)
- IT 108-89-4, 4-Picoline 108-99-6, 3-  
Picoline 7664-41-7, Ammonia, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(preparation of cyanopyridines from picolines using vanadium  
-silico-alumino-phosphate ammoxidn. catalysts  
)
- IT 1941-30-6  
RL: CAT (Catalyst use); USES (Uses)  
(template; preparation of cyanopyridines from picolines using  
vanadium-silico-alumino-phosphate ammoxidn.  
catalysts)

L44 ANSWER 2 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2005:159890 HCAPLUS Full-text

DN 142:219137

TI Catalysts for the production of cyanopyridines by Instant  
vapor-phase ammoxidation Application

IN Fischer, Achim; Martin, Andreas; Luecke, Bernhard; Kalevaru, Venkata  
Narayana; Weckbecker, Christoph; Huthmacher, Klaus

PA Reilly Industries, Inc., USA

SO Ger. Offen., 8 pp.

CODEN: GWXXBX

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10335454	A1	20050224	DE 2003-10335454	200308 02
				<--	
	WO 2005016505	A2	20050224	WO 2004-US24939	200407 30
				<--	
	WO 2005016505	A3	20050609		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,				

GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP,  
 KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
 MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD,  
 SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,  
 VC, VN, YU, ZA, ZM, ZW  
 RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW,  
 AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ,  
 DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL,  
 PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ,  
 GW, ML, MR, NE, SN, TD, TG

EP 1654233                      A2              20060510              EP 2004-779870  
 200407  
 30

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 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
 PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK

CN 1832923                      A              20060913              CN 2004-80022489  
 200407  
 30

<--  
 CN 100545149                      C              20090930  
 JP 2007501119                      T              20070125              JP 2006-522661  
 200407  
 30

<--  
 IN 2006CN00419                      A              20070518              IN 2006-CN419  
 200602  
 01

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 US 20070117984                      A1              20070524              US 2007-566868  
 200701  
 16

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 PRAI DE 2003-10335454                      A              20030802 <--  
 WO 2004-US24939                      W              20040730 <--

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The title **catalysts**, which give good space-time yields and  
 selectivity at  $\leq 440^\circ$ , have the formula  $[V_1PaXbYcOd]e[Z]f$  ( $X = Cr, Mo,$   
 $Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Zn, Nb$ ;  $Y =$  cyclic N compound;  $Z$   
 $= SiO_2, Al_2O_3, ZrO_2, TiO_2$ ;  $a = 0.1-2.5$ ;  $b = 0-3.0$ ;  $c = 0.1-10$ ;  $e = 5-$   
 $100$ ;  $f = 95-0$ ). Stirring 0.1 mol V2O5 in 110 mL BuOH and 73 mL  
 PhCH2OH at reflux for 3 h and then overnight at room temperature,  
 adding a stoichiometric amount of 85% H3PO4, refluxing for 2 h,  
 filtering at room temperature, washing with EtOH, drying at  $120^\circ$ , and  
 calcining at  $450^\circ$  in N-O for 3 h gave (VO)2P2O7 (I). Passing 3-  
 methylpyridine with a 28.4:5.6:8.2 mixture of air, NH3, and H2O at  
 space velocity 2300/h over a 5 g 1:1 I-corundum at  $360^\circ$  gave

conversion 52, yield 43.7, and selectivity 84 mol%, resp. (CO and CO<sub>2</sub> 0.7 and 4.9 mol%).

IC ICM B01J027-198

CC 27-2 (Heterocyclic Compounds (One Hetero Atom))

Section cross-reference(s): 67

ST ammoxidn methylpyridine catalyst; vanadium  
phosphate catalyst ammoxidn; pyridinecarbonitrile  
manuf ammoxidn catalyst

IT Ammoxidation catalysts  
(catalysts for the production of cyanopyridines by  
vapor-phase ammoxidn.)

IT 108-99-6DP, 3-Picoline, reaction  
products with vanadyl phosphate 7439-88-5P, Iridium, preparation  
7439-89-6P, Iron, preparation 7439-98-7P, Molybdenum, preparation  
7440-02-0P, Nickel, preparation 7440-03-1P, Niobium, preparation  
7440-05-3P, Palladium, preparation 7440-06-4P, Platinum,  
preparation 7440-16-6P, Rhodium, preparation 7440-18-8P,  
Ruthenium, preparation 7440-33-7P, Tungsten, preparation  
7440-47-3P, Chromium, preparation 7440-48-4P, Cobalt, preparation  
7440-66-6P, Zinc, preparation 58834-75-6P  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
(Preparation); USES (Uses)  
(catalysts for the production of cyanopyridines by  
vapor-phase ammoxidn.)

IT 100-54-9P, 3-Cyanopyridine  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(catalysts for the production of cyanopyridines by  
vapor-phase ammoxidn.)

IT 108-99-6, 3-Picoline  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalysts for vapor-phase ammoxidn. of  
methylpyridines)

L44 ANSWER 3 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2004:857479 HCAPLUS Full-text

DN 141:320777

TI Ti-pillared clay based vanadia catalyst and process for  
preparation

IN Roy, Shyam Kishore; Roy, Subhash Chandra; Dutta, Pasupati; Nandi,  
Laxmi Narayan; Yadav, Satya Niketan

PA Council of Scientific and Industrial Research, India; Council Scient  
Ind Res

SO PCT Int. Appl., 15 pp.  
CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2004087310	A1	20041014	WO 2003-IN101	20030331
<--				
WO 2004087310	A9	20051110		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2003226632	A1	20041025	AU 2003-226632	20030331
<--				
AU 2003226632	B2	20070322		
EP 1617946	A1	20060125	EP 2003-816516	20030331
<--				
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
JP 2006513852	T	20060427	JP 2004-570070	20030331
<--				
CN 1771084	A	20060510	CN 2003-826467	20030331
<--				
CN 100518926	C	20090729		
BR 2003018258	A	20060523	BR 2003-18258	20030331
<--				
PRAI WO 2003-IN101	A	20030331	<--	
AB	This invention relates to a process for the preparation of highly active and selective ammoxidn. catalyst using a complex metal oxide			

containing P, V and Mo supported on Ti-PILC which process involves heating on water bath a V source with oxalic acid in the presence of H<sub>2</sub>O to form vanadyl oxalate; adding a source of phosphorous and a source of Mo and Ti-PILC and heating the resultant mixture in the presence of air at a temperature at 110-450° for a period at 15-35 h. This involves also relates to the use of said ammoxidn. catalyst in the preparation of heteroarom. nitriles from methylpyridines which comprises passing as a reactant stream a gaseous mixture comprising, a Me substituted pyridine, NH<sub>3</sub> and O (air) over the fixed bed ammoxidn. catalyst at a temperature of .apprx.350-450°.

- IC ICM B01J021-06  
ICS B01J021-16; B01J029-04; B01J027-18; C07D213-00
- CC 67-3 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
Section cross-reference(s): 27
- ST molybdoxovanadophosphate titania pillared montmorillonite supported  
prepn ammoxidn catalyst; methylpyridine ammoxidn  
molybdoxovanadophosphate supported catalyst
- IT Nitriles, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation by ammoxidn. of methylpyridines in presence of  
molybdoxovanadophosphate supported on titania-pillared  
montmorillonite as catalyst)
- IT Ammoxidation catalysts  
(preparation of molybdoxovanadophosphate supported on titania-  
pillared  
montmorillonite for methylpyridines)
- IT 108-99-6, 3-Methylpyridine  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(ammoxidn. in presence of molybdoxovanadophosphate supported on  
titania-pillared montmorillonite as catalysts)
- IT 15500-04-6P, Vanadyl oxalate  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation);  
RACT (Reactant or reagent)  
(preparation and reactant for preparation of  
molybdoxovanadophosphate  
supported on titania-pillared montmorillonite as ammoxidn.  
catalysts for methylpyridines)
- IT 1318-93-ODP, Montmorillonite, titania-pillared montmorillonite,  
molybdoxovanadophosphate supported 13463-67-7DP, Titania,  
titania-pillared montmorillonite, molybdoxovanadophosphate supported  
37280-68-5DP, Molybdenum vanadium hydroxide oxide  
phosphate, titania-pillared montmorillonite supported  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP  
(Preparation); USES (Uses)  
(preparation as ammoxidn. catalysts for methylpyridines)
- IT 7439-91-OD, Lanthanum, titania-pillared montmorillonite containing,

- molybdoxovanadophosphate supported 7440-45-1D, Cerium, titania-pillared montmorillonite containing, molybdoxovanadophosphate supported
- RL: NUU (Other use, unclassified); USES (Uses)  
(preparation as ammoxidn. **catalysts** for methylpyridines)
- IT 100-54-9P, 3-Cyanopyridine  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation by ammoxidn. of methylpyridine in presence of molybdoxovanadophosphate supported on titania-pillared montmorillonite as **catalysts**)
- IT 144-62-7, Oxalic acid, reactions 1313-27-5, Molybdenum trioxide, reactions 1314-62-1, Vanadium pentoxide, reactions 2466-09-3, Diphosphoric acid 7664-38-2, Phosphoric acid, reactions 7803-55-6, Ammonium metavanadate 10343-62-1, Metaphosphoric acid 11098-84-3, Ammonium molybdate 11099-11-9, Vanadium oxide 27774-13-6, Vanadyl sulfate  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reactant for preparation of molybdoxovanadophosphate supported on titania-pillared montmorillonite as ammoxidn. **catalysts** for methylpyridines)
- IT 12026-53-8, Paragonite  
RL: NUU (Other use, unclassified); USES (Uses)  
(use in preparation of molybdoxovanadophosphate supported on titania-pillared paragonite as ammoxidn. **catalysts** for methylpyridines)
- IT 12174-40-2, Rectorite  
RL: NUU (Other use, unclassified); USES (Uses)  
(use in preparation of molybdoxovanadophosphate supported on titania-pillared rectorite as ammoxidn. **catalysts** for methylpyridines)
- RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT
- L44 ANSWER 4 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 2004:504910 HCAPLUS Full-text  
DN 141:173658  
TI Crystalline CrV0.95P0.05O4 **catalyst** for the vapor-phase oxidation of picolines  
AU Takehira, K.; Shishido, T.; Song, Z.; Matsushita, T.; Kawabata, T.; Takaki, K.  
CS Department of Chemistry and Chemical Engineering, Graduate School of Engineering, Hiroshima University, 1-4-1 Kagamiyama, Higashi-Hiroshima, 739-8527, Japan  
SO Catalysis Today (2004), 91-92, 7-11  
CODEN: CATTEA; ISSN: 0920-5861  
PB Elsevier Science B.V.  
DT Journal

LA English  
 OS CASREACT 141:173658  
 AB The catalytic behavior of CrV0.95P0.05O4 was studied in the selective oxidation of picolines and the oxidation mechanism is discussed. Broensted acid site was detected on the surface of CrV0.95P0.05O4, and the amount increased by the addition of steam in the reaction mixture, resulting in an enhanced activity for the selective oxidation. Picoline is adsorbed via the N atom coordination to Broensted acid site, and the substituted Me group is oxidized by surface oxide ion to produce aldehyde and then acid. Thus, Mars and van Krevelen mechanism is suggested for picoline oxidation based on the DRIFTS anal. 2- and 4-Picolines were more quickly oxidized than 3-picoline due to the inductive hyperconjugative effect of nitrogen, resulting in an easy leaving of proton from the Me group. 4-Picoline produced almost quant. isonicotinic acid, while 2-picoline afforded picoline-2-carbaldehyde as the main product due to the instability of the acid product, i.e., the decarboxylation of picolinic acid took place to form pyridine.

CC 21-2 (General Organic Chemistry)  
 Section cross-reference(s): 27, 67

ST chromium vanadium phosphorus oxide catalyst vapor phase oxidn picoline; cryst oxide catalyst vapor phase oxidn picoline

IT Adsorbed substances  
 Methyl group  
 Steam  
 Surface reaction  
 (crystalline CrV0.95P0.05O4 catalyst for vapor-phase oxidation of picolines)

IT Bronsted acids  
 RL: CAT (Catalyst use); CPS (Chemical process); PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent); USES (Uses)  
 (crystalline CrV0.95P0.05O4 catalyst for vapor-phase oxidation of picolines)

IT IR reflectance spectra  
 (diffuse, Fourier-transform; crystalline CrV0.95P0.05O4 catalyst for vapor-phase oxidation of picolines)

IT Oxidation  
 Oxidation catalysts  
 (gas-phase; crystalline CrV0.95P0.05O4 catalyst for vapor-phase oxidation of picolines)

IT Hyperconjugation  
 Inductive effect  
 (oxidation rapidity and; crystalline CrV0.95P0.05O4 catalyst for vapor-phase oxidation of picolines)

IT Decarboxylation

- (picolinic acid; crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT Oxidation  
(selective; crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT Reaction mechanism  
(surface, Mars and van Krevelen; crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT 586-95-8P, 4-Pyridinemethanol 17252-51-6P,  
4,4'-Trimethylenedipyridine  
RL: BYP (Byproduct); PREP (Preparation)  
(crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT 110-86-1P, Pyridine, preparation  
RL: BYP (Byproduct); SPN (Synthetic preparation); PREP (Preparation)  
(crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT 474900-66-8, Chromium vanadium oxide phosphate  
(CrV0.95O3.8(P04)0.05)  
RL: CAT (Catalyst use); USES (Uses)  
(crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT 108-89-4, 4-Picoline 108-89-4D, 4-Picoline, catalyst  
surface bound 109-06-8, 2-Picoline 109-06-8D, 2-Picoline,  
catalyst surface bound  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PRP (Properties); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)  
(crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT 7732-18-5, Water, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT 98-98-6P, Picolinic acid  
RL: PNU (Preparation, unclassified); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT 55-22-1P, Isonicotinic acid, preparation 1121-60-4P,  
Pyridine-2-carbaldehyde  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(crystalline CrV0.95P0.0504 catalyst for vapor-phase oxidation of picolines)
- IT 872-85-5P, Pyridine-4-carbaldehyde  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(mechanistic reaction intermediate in carboxylic acid formation;



crystalline CrV0.95P0.0504 **catalyst** for vapor-phase oxidation of picolines)

IT 108-99-6, 3-Picoline  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (slow reaction; crystalline CrV0.95P0.0504 **catalyst** for vapor-phase oxidation of picolines)

OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

RE.CNT 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 5 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2003:800623 HCAPLUS Full-text  
 DN 140:321210  
 TI Study on ammoxidation of heteroaromatic compounds to prepare aromatic nitriles. I. Ammoxidation of 3-picoline to nicotinonitrile  
 AU Yu, Peng; Huang, Chi; Li, Xiao-Yun; Zheng, Qiong  
 CS College of Chemistry and Molecular Sciences, Wuhan University, Wuhan, 430072, Peop. Rep. China  
 SO Wuhan Daxue Xuebao, Lixueban (2003), 49(2), 179-182  
 CODEN: WDXLA5  
 PB Wuhan Daxue Qikanshe  
 DT Journal  
 LA Chinese  
 OS CASREACT 140:321210  
 AB Ammoxidn. of 3-picoline to nicotinonitrile on VPO/SiO2 (vanadium-phosphorus oxide/silica) **catalysts** has been investigated. Based on appraising tests, the efficient **catalysts** have been found. The influence of the components of the **catalyst**, reaction temperature, the ratio of air, the ratio of ammonia and ratio of water on the conversion of 3-picoline, the molar yield and selectivity of nicotinonitrile have been researched resp. Using **catalyst** Z697, on optimum conditions the highest conversion is 100%, molar yield is 85.2%. The nicotinonitrile obtained is white needle crystal with the purity higher than 99%.

CC 27-16 (Heterocyclic Compounds (One Hetero Atom))  
 Section cross-reference(s): 45, 67

ST picoline ammoxidn **catalyst** vanadium phosphorus oxide silica; nicotinonitrile prepn

IT Ammoxidation  
 Ammoxidation **catalysts**  
 (ammoxidn. of 3-picoline to nicotinonitrile with vanadium-phosphorus oxide/silica **catalyst**)

IT 7631-86-9, Silica, uses 65506-75-4, Phosphorus vanadium oxide  
 RL: CAT (Catalyst use); USES (Uses)  
 (ammoxidn. of 3-picoline to nicotinonitrile

with vanadium-phosphorus oxide/silica catalyst)  
 IT 108-99-6, 3-Picoline

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (ammonixdn. of 3-picoline to nicotinonitrile  
 with vanadium-phosphorus oxide/silica catalyst)

IT 100-54-9P, Nicotinonitrile

RL: SPN (Synthetic preparation); PREP (Preparation)  
 (ammonixdn. of 3-picoline to nicotinonitrile  
 with vanadium-phosphorus oxide/silica catalyst)

L44 ANSWER 6 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2003:482931 HCAPLUS Full-text

DN 139:239015

TI Crystalline CrV1-xPxO4 catalysts for the vapor-phase  
 oxidation of 3-picoline

AU Song, Zhaoxia; Matsushita, Toshiyuki; Shishido, Tetsuya; Takehira,  
 Katsuomi

CS Graduate School of Engineering, Department of Chemistry and Chemical  
 Engineering, Hiroshima University, 1-4-1 Kagamiyama,  
 Higashi-Hiroshima, 739-8527, Japan

SO Journal of Catalysis (2003), 218(1), 32-41

CODEN: JCTLA5; ISSN: 0021-9517

PB Elsevier Science

DT Journal

LA English

AB The heterogeneously catalyzed vapor-phase oxidation of 3-picoline to  
 nicotinic acid over mixed oxides, CrV1-xPxO4, were studied at 300-  
 400°. Characterizations of the catalysts were carried out using x-ray  
 diffraction, FTIR, TG-DTA, BET, NH3-TPD, TPR, and pyridine adsorption  
 diffuse reflectance IR Fourier-transform spectra (DRIFTS).  
 Characterizations of the catalysts were carried out using x-ray  
 diffraction, FTIR, TG-DTA, BET, NH3-TPD, TPR, and pyridine adsorption  
 diffuse reflectance IR Fourier-transform spectra (DRIFTS). The mixed  
 oxides, CrV1-xPxO4 (x = 0-1.0), were precipitated by adjusting the pH  
 from an aqueous solution of the mixture of the raw materials. The  
 ppts. were calcined at 550-700° and employed as the catalyst for the  
 selective oxidation of 3- picoline. During the calcination, a  
 crystallization of monoclinic CrVO4-I phase of  $\alpha$ -MnMoO4 structure was  
 clearly observed by TG-DTA, FTIR, and XRD analyses of the CrV1-xPxO4,  
 in the range of x < 0.1. In these CrV1-xPxO4, P atoms replace V  
 atoms in the VO4 tetrahedra still keeping a monoclinic CrVO4-I  
 structure. This structure changed to amorphous by further addition  
 of P (x > 0.25) or to orthorhombic CrVO4-III by further calcination  
 at high temperature (>700°), resulting in the catalyst deactivation.  
 CrVO4-I was originally active and the addition of a small amount of P  
 resulted in a high enhancement in the catalytic activity;  
 CrV0.95P0.05O4 showed the highest activity among the catalysts

tested. NH<sub>3</sub>-TPD showed an increase in the acid site by replacing V with a small amount of P in CrV04-I. A favorable effect of H<sub>2</sub>O addition suggests that Bronsted acid assists the selective oxidation, and this was confirmed by IR study of pyridine adsorption on the catalysts. The active catalysts, CrV1-xPxO4 (0<x<0.1), alone revealed a weak reduction peak of V around 350° in the TPR, and the peak temperature was the lowest over the most active catalyst. The reduction-oxidation property was reversibly observed with the peak when the catalyst was treated by H<sub>2</sub> and O<sub>2</sub> atmosphere alternately. Also, activation energy calculated from 3-picoline consumption was also the lowest over the most active catalyst. All the V species are isolated as VO<sub>4</sub> tetrahedra in the CrV04-I structure and considered to work as the active sites via its reduction-oxidation assisted by both Cr and phosphorous atoms. 3-Picoline is selectively oxidized on the V sites by the reduction-oxidation further assisted by the Bronsted-acid sites over the crystallized CrV0.95P0.05O4 catalyst.

- CC 78-5 (Inorganic Chemicals and Reactions)  
 Section cross-reference(s): 27, 67, 75
- ST chromium vanadium phosphate prepn oxidn  
 catalyst picoline; crystal structure chromium vanadate
- IT Acidity  
 (of chromium vanadium phosphates as selective  
 oxidation catalysts for picoline)
- IT Activation energy  
 (of oxidation of picoline in presence of chromium vanadium  
 phosphates as catalysts)
- IT Oxidation catalysts  
 (preparation of chromium vanadium phosphates as  
 selective oxidation catalyst for picoline)
- IT 13548-45-3P, Chromium vanadium oxide (CrV04)  
 RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic  
 preparation); PREP (Preparation); USES (Uses)  
 (preparation and surface area and crystal structure and selective  
 oxidation catalyst for picoline)
- IT 7789-04-0P, Chromium phosphate (CrPO4) 474900-65-7P, Chromium  
 vanadium oxide phosphate (CrV0.9803.92(P04)0.02)  
 474900-66-8P, Chromium vanadium oxide phosphate  
 (CrV0.9503.8(P04)0.05) 474900-67-9P, Chromium vanadium  
 oxide phosphate (CrV0.903.6(P04)0.1) 474900-68-0P,  
 Chromium vanadium oxide phosphate  
 (CrV0.7503(P04)0.25) 474900-69-1P, Chromium vanadium  
 oxide phosphate (CrV0.502(P04)0.5)  
 RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic  
 preparation); PREP (Preparation); USES (Uses)  
 (preparation and surface area and selective oxidation catalyst  
 for picoline)
- IT 108-99-6, 3-Picoline

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of chromium **vanadium phosphates** as  
 selective oxidation **catalyst** for picoline)

IT 7722-76-1, Ammonium dihydrogen phosphate 7803-55-6, Ammonium  
 metavanadate 13548-38-4, Chromium trinitrate

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reactant for preparation of chromium **vanadium  
 phosphates** as selective oxidation **catalyst** for  
 picoline)

OSC.G 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS RECORD (7  
 CITINGS)

RE.CNT 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 7 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2003:447466 HCAPLUS Full-text

DN 139:230215

TI In situ DRIFTS study of picoline oxidation over CrV0.95P0.05O4  
**catalyst**

AU Shishido, T.; Song, Z.; Matsushita, T.; Takaki, K.; Takehira, K.  
 CS Department of Chemistry and Chemical Engineering, Graduate School of  
 Engineering, Hiroshima University, Higashi-Hiroshima, 739-8527,  
 Japan

SO Physical Chemistry Chemical Physics (2003), 5(12),  
 2710-2718

CODEN: PPCPFQ; ISSN: 1463-9076

PB Royal Society of Chemistry

DT Journal

LA English

AB The **catalytic** behavior of CrV0.95P0.05O4 has been investigated in the  
 selective oxidns. of 2-, 3- and 4-picoline by in situ DRIFTS, and  
 the model of picoline adsorption and the oxidation mechanism are  
 proposed. Both Lewis and Bronsted acid sites were detected on the  
 surface of CrV0.95P0.05O4, and the number of the latter increased on  
 the addition of steam in the reaction mixture, resulting in enhanced  
 activity for selective oxidns. The enhanced activity due to water  
 addition is interpreted by the fact that Bronsted acid sites are  
 produced by the hydrolysis of V-O-Cr and activate picoline mols. by  
 withdrawing the electrons of the pyridine ring, and at the same time,  
 enable to accelerate the desorption of the acid products from the  
**catalyst** surface. Every 2-, 3- and 4-picoline was adsorbed on the  
**catalyst** surface via the N atom donating the electrons to the  
 Bronsted acid sites, and the substituted Me group was oxidized via  
 hydrogen abstraction by surface oxide ion to form the radical  
 intermediate, followed by oxygen insertion to produce the  
 corresponding aldehyde and then acid. Even in the absence of gaseous  
 oxygen, the oxygenated products were formed and observed over the

catalyst surface by in situ DRIFTS. Thus, a Mars and van Krevelen mechanism was suggested for 2-, 3- and 4-picoline oxidns. based on the spectral anal. Both 2- and 4-picoline were more quickly oxidized than 3- picoline due to the inductive hyperconjugative effect of nitrogen, resulting in an easy leaving of proton from the Me group. 4-Picoline produced almost quant. isonocotinic acid, while 2-picoline afforded 2-picoline aldehyde as the main product due to the instability of the acid product, i.e., the decarboxylation of picolinic acid took place to form pyridine.

- CC 22-4 (Physical Organic Chemistry)  
Section cross-reference(s): 67
- ST DRIFTS study picoline oxidn chromium vanadium phosphorus oxide catalyst
- IT Surface acidity  
(Bronsted; in situ DRIFTS study of picoline oxidation over chromium vanadium phosphorus oxide catalyst)
- IT Diffuse reflectance IR spectroscopy  
(Fourier-transform; in situ DRIFTS study of picoline oxidation over chromium vanadium phosphorus oxide catalyst)
- IT Surface acidity  
(Lewis; In situ DRIFTS study of picoline oxidation over CrV0.95P0.05O4 catalyst)
- IT Activation energy  
(apparent; in situ DRIFTS study of picoline oxidation over chromium vanadium phosphorus oxide catalyst)
- IT Hyperconjugation  
Oxidation  
Oxidation catalysts  
(in situ DRIFTS study of picoline oxidation over chromium vanadium phosphorus oxide catalyst)
- IT Lewis acidity  
(surface; In situ DRIFTS study of picoline oxidation over CrV0.95P0.05O4 catalyst)
- IT Bronsted acidity  
(surface; in situ DRIFTS study of picoline oxidation over chromium vanadium phosphorus oxide catalyst)
- IT 474900-66-8, Chromium vanadium oxide phosphate  
(CrV0.95O3.8(P04)0.05)  
RL: CAT (Catalyst use); USES (Uses)  
(in situ DRIFTS study of picoline oxidation over chromium vanadium phosphorus oxide catalyst)
- IT 108-89-4, 4-Picoline 108-99-6, 3-Picoline 109-06-8, 2-Picoline  
RL: RCT (Reactant); RACT (Reactant or reagent)

(in situ DRIFTS study of picoline oxidation over chromium vanadium phosphorus oxide **catalyst**)

OSC.G 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD (4 CITINGS)  
 RE.CNT 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 8 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2002:873614 HCAPLUS Full-text

DN 137:369977

TI Gas-phase oxidation **catalysts**, and preparation of aldehydes or carboxylic acids using them

IN Kuroda, Yasushi; Tsuji, Katsuyuki; Nakajo, Tetsuo; Takehira, Katsuomi; Shishido, Tetsuya

PA Showa Denko K. K., Japan

SO Jpn. Kokai Tokkyo Koho, 15 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	---	-----	-----	
PI	JP 2002331239	A	20021119	JP 2002-56067	20020301

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PRAI JP 2001-62011 A 20010306 <--

AB Title compds. are prepared by gas-phase oxidation of alkyl compds. in the presence of **catalysts** containing V- and Cr-containing crystalline mixed oxides showing specific x-ray diffraction pattern (given in claim). Activity of the **catalysts** is evaluated by powder x-ray diffraction.  $\beta$ -Picoline was oxidized by O in the presence of CrVO<sub>4</sub> (mainly comprising CrVO<sub>4</sub>-I) at 360° to give 43.5% nicotinic acid.

IC ICM B01J023-26

ICS B01J027-199; C01B025-45; C01G037-00; C07D213-807; C07B061-00

CC 27-16 (Heterocyclic Compounds (One Hetero Atom))

Section cross-reference(s): 67

ST oxidn **catalyst** vanadium chromium oxide; aldehyde prepn oxidn **catalyst** mixed oxide; carboxylic acid prepn oxidn **catalyst** oxide; picoline oxidn chromium vanadium oxide **catalyst**; nicotinic acid prepn gas phase oxidn

IT Powder x-ray diffractometry

(**catalyst** evaluation by; oxide **catalysts** for gas-phase oxidation of alkyl compds. into aldehydes or carboxylic acids)

IT Oxidation **catalysts**

- (gas-phase; oxide catalysts for gas-phase oxidation of alkyl compds. into aldehydes or carboxylic acids)
- IT Aldehydes, preparation  
Carboxylic acids, preparation  
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
(oxide catalysts for gas-phase oxidation of alkyl compds. into aldehydes or carboxylic acids)
- IT 13548-45-3P, Chromium vanadium oxide (CrVO4) 369647-56-3P,  
Aluminum chromium vanadium oxide (Al0.5Cr0.5VO4) 474900-66-8P,  
Chromium vanadium oxide phosphate  
(CrVO.95O3.8(PO4)0.05)  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(oxide catalysts for gas-phase oxidation of alkyl compds. into aldehydes or carboxylic acids)
- IT 55-22-1P, Isonicotinic acid, preparation 59-67-6P, Nicotinic acid, preparation 98-98-6P, 2-Pyridinecarboxylic acid 872-85-5P,  
4-Pyridinecarboxaldehyde 1121-60-4P, 2-Pyridinecarboxaldehyde  
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
(oxide catalysts for gas-phase oxidation of alkyl compds. into aldehydes or carboxylic acids)
- IT 108-89-4,  $\gamma$ -Picoline 108-99-6,  $\beta$ -Picoline  
109-06-8,  $\alpha$ -Picoline  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(oxide catalysts for gas-phase oxidation of alkyl compds. into aldehydes or carboxylic acids)
- OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)
- L44 ANSWER 9 OF 20 HCAPLUS COPYRIGHT 2010 ACS ON STN  
AN 2002:415352 HCAPLUS Full-text  
DN 137:352468  
TI Crystalline CrVO.95PO.05O4 catalyst for vapor-phase oxidation of picolines  
AU Song, Zhaoxia; Matsushita, Toshiyuki; Shishido, Tetsuya; Takehira, Katsuomi  
CS Department of Chemistry and Chemical Engineering, Graduate School of Engineering, Hiroshima University, Higashi-Hiroshima, 739-8527, Japan  
SO Chemical Communications (Cambridge, United Kingdom) (2002), (12), 1306-1307  
CODEN: CHCOFS; ISSN: 1359-7345  
PB Royal Society of Chemistry  
DT Journal  
LA English

OS CASREACT 137:352468

AB Calcinated CrV0.95P0.0504 prepared as a pure crystalline form was found to be highly active for the vapor-phase oxidation of picolines to the corresponding aldehydes and acids in the presence of water.

CC 21-2 (General Organic Chemistry)  
Section cross-reference(s): 22, 67

ST chromium vanadium phosphor oxide **catalyst** vapor phase oxidn picoline

IT Oxidation  
Oxidation **catalysts**  
(gas-phase; activities of calcinated crystalline chromium-vanadium-phosphor oxide **catalysts** for vapor-phase oxidation of picolines)

IT 7789-04-0, Chromium phosphate (CrP04) 13548-45-3, Chromium vanadium oxide (CrV04) 474900-65-7, Chromium **vanadium oxide phosphate** (CrV0.9803.92(P04)0.02) 474900-66-8, Chromium **vanadium oxide phosphate** (CrV0.9503.8(P04)0.05) 474900-67-9, Chromium **vanadium oxide phosphate** (CrV0.903.6(P04)0.1) 474900-68-0, Chromium **vanadium oxide phosphate** (CrV0.7503(P04)0.25) 474900-69-1, Chromium **vanadium oxide phosphate** (CrV0.502(P04)0.5)  
RL: CAT (Catalyst use); USES (Uses)  
(activities of calcinated crystalline chromium-vanadium-phosphor oxide **catalysts** for vapor-phase oxidation of picolines)

IT 108-89-4, 4-Picoline 108-99-6, 3-Picoline 109-06-8, 2-Picoline  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(activities of calcinated crystalline chromium-vanadium-phosphor oxide **catalysts** for vapor-phase oxidation of picolines)

IT 55-22-1P, Isonicotinic acid, preparation 59-67-6P, Nicotinic acid, preparation 500-22-1P, Pyridine-3-carbaldehyde 872-85-5P, Pyridine-4-carbaldehyde 1121-60-4P, 2-Pyridinecarboxaldehyde  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(activities of calcinated crystalline chromium-vanadium-phosphor oxide **catalysts** for vapor-phase oxidation of picolines)

IT 124-38-9P, Carbon dioxide, preparation  
RL: BYP (Byproduct); PREP (Preparation)  
(byproduct; activities of calcinated crystalline chromium-vanadium-phosphor oxide **catalysts** for vapor-phase oxidation of picolines)

IT 13463-67-7, Titania, uses  
RL: CAT (Catalyst use); USES (Uses)  
(**catalyst** support; activities of calcinated crystalline



chromium-vanadium-phosphor oxide **catalysts** for  
vapor-phase oxidation of picolines)

IT 7732-18-5, Water, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(effect of water on activities of calcinated crystalline  
chromium-vanadium-phosphor oxide **catalysts** for  
vapor-phase oxidation of picolines)

IT 110-86-1P, Pyridine, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(trace product; activities of calcinated crystalline  
chromium-vanadium-phosphor oxide **catalysts** for  
vapor-phase oxidation of picolines)

OSC.G 5 THERE ARE 5 CAPLUS RECORDS THAT CITE THIS RECORD (5  
CITINGS)

RE.CNT 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 10 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 1998:667183 HCAPLUS Full-text  
DN 130:24630  
TI **Vanadium phosphates**: a new type of heterogeneous  
**catalyst** for the liquid phase oxidation of hydrocarbons and  
their derivatives

AU Zazhigalov, V. A.; Gansior, M.; Vartikyan, L.; Podobinski, E.;  
Bacherikova, I. V.

CS L. V. Pisarzhevskii Institute of Physical Chemistry, Academy of  
Sciences of Ukraine, Kiev, 252039, Ukraine

SO Theoretical and Experimental Chemistry (Translation of  
Teoreticheskaya i Eksperimental'naya Khimiya) (1998),  
34(1), 41-43  
CODEN: TEXCAK; ISSN: 0040-5760

PB Consultants Bureau  
DT Journal  
LA English

AB The activity of **vanadium phosphates** in the liquid phase oxidation of  
10 hydrocarbons and their derivs. (benzene, phenol, toluene,  
naphthalene, naphthol,  $\alpha$ -,  $\beta$ - and  $\gamma$ -picolines, pyridine and  
cyclohexanol) have been studied for the first time. The activity and  
the composition of the oxidation products depend on both the phases  
of the **vanadium phosphate** and the nature of the metals added to it.  
A series of new compds. is formed, along with typical products of  
liquid phase oxidation, with these **catalysts**.

CC 21-2 (General Organic Chemistry)  
ST oxidn hydrocarbon **vanadium phosphate**  
IT Oxidation  
Oxidation **catalysts**  
(liquid phase oxidation of hydrocarbons and their derivs.)

catalyzed by vanadium phosphates)

IT Hydrocarbons, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (liquid phase oxidation of hydrocarbons and their derivs.  
 catalyzed by vanadium phosphates)

IT 12359-27-2 58834-75-6 93280-40-1 96150-43-5, Cesium  
 vanadium oxide phosphate 96150-54-8,  
 Vanadium zinc oxide phosphate 169314-64-1,  
 Bismuth phosphorus vanadium oxide 216446-29-6, Bismuth sodium  
 vanadium oxide phosphate  
 RL: CAT (Catalyst use); USES (Uses)  
 (liquid phase oxidation of hydrocarbons and their derivs.  
 catalyzed by vanadium phosphates)

IT 71-43-2, Benzene, reactions 91-20-3, Naphthalene, reactions  
 108-88-3, Toluene, reactions 108-89-4 108-93-0, Cyclohexanol,  
 reactions 108-99-6 109-06-8 110-86-1, Pyridine,  
 reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (liquid phase oxidation of hydrocarbons and their derivs.  
 catalyzed by vanadium phosphates)

IT 90-15-3P,  $\alpha$ -Naphthol 108-95-2P, Phenol, preparation  
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation);  
 RACT (Reactant or reagent)  
 (liquid phase oxidation of hydrocarbons and their derivs.  
 catalyzed by vanadium phosphates)

IT 100-52-7P, Benzaldehyde, preparation 108-94-1P, Cyclohexanone,  
 preparation 130-15-4P, 1,4-Naphthoquinone 694-59-7P, Pyridine  
 N-oxide 931-19-1P,  $\alpha$ -Picoline N-oxide 1003-67-4P,  
 $\gamma$ -Picoline N-oxide 1003-73-2P,  $\beta$ -Picoline N-oxide  
 1319-77-3P, Cresol 1320-69-0P 54774-79-7P, Phenol, phenoxy  
 216483-95-3P  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (liquid phase oxidation of hydrocarbons and their derivs.  
 catalyzed by vanadium phosphates)

OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1  
 CITINGS)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 11 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1998:133350 HCAPLUS Full-text  
 DN 128:168961  
 OREF 128:33281a,33284a  
 TI Ammoxidation of 3-picoline to nicotinonitrile  
 over vanadium phosphorus oxide-based catalysts  
 AU Manohar, Basude; Reddy, Benjaram M.  
 CS Inorganic Chemistry Division, Indian Institute of Chemical

- Technology, Hyderabad, 500 007, India  
 SO Journal of Chemical Technology & Biotechnology (1998),  
 71(2), 141-146  
 CODEN: JCTBED; ISSN: 0268-2575  
 PB John Wiley & Sons Ltd.  
 DT Journal  
 LA English  
 AB Ammoxidn. of 3-picoline to nicotinonitrile was investigated on  
 vanadium phosphorus oxide (VPO), VPO/SiO<sub>2</sub> and additive atom (Cu, Zr,  
 Mn, and Co)-incorporated VPO catalysts under atmospheric pressure at  
 673 K. For comparison, a conventional V<sub>2</sub>O<sub>5</sub>-MoO<sub>3</sub>/Al<sub>2</sub>O<sub>3</sub> catalyst was  
 also studied under identical conditions. These catalysts were  
 characterized by means of X-ray diffraction, ESR, IR, ammonia  
 chemisorption, and BET surface area methods. The VPO -based  
 catalysts show better performance than the V<sub>2</sub>O<sub>5</sub>-MoO<sub>3</sub>/Al<sub>2</sub>O<sub>3</sub> catalyst.  
 Further, the VPO/SiO<sub>2</sub> and VPO catalysts exhibit better conversion and  
 product selectivities than the additive-containing VPO catalysts.  
 Better activity of VPO and VPO /SiO<sub>2</sub> catalysts was related to their  
 high active surface area, higher surface acidity, and lower oxidation  
 state of vanadium. The redox couple between (VO)2P2O7 (V<sup>4+</sup>) and α1-  
 VOP<sub>4</sub> (V<sup>5+</sup>) phases appears to be responsible for the ammoxidn.  
 activity of VPO catalysts.  
 CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 67  
 ST picoline ammoxidn nicotinonitrile selectivity; catalyst  
 ammoxidn vanadium phosphorus oxide  
 IT Ammoxidation catalysts  
 (vanadium phosphorus oxide-based catalysts for  
 ammoxidn. of 3-picoline)  
 IT 7439-96-5, Manganese, uses 7440-48-4, Cobalt, uses 7440-50-8,  
 Copper, uses 7440-67-7, Zirconium, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (in vanadium phosphorus oxide-based catalysts for  
 ammoxidn. of 3-picoline)  
 IT 7631-86-9, Silica, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (supports; vanadium phosphorus oxide-based catalysts  
 for ammoxidn. of 3-picoline)  
 IT 12359-27-2 58834-75-6  
 RL: CAT (Catalyst use); USES (Uses)  
 (vanadium phosphorus oxide-based catalysts for  
 ammoxidn. of 3-picoline)  
 IT 100-54-9P, Nicotinonitrile  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (vanadium phosphorus oxide-based catalysts for  
 ammoxidn. of 3-picoline to)  
 IT 108-99-6, 3-Picoline

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (vanadium phosphorus oxide-based **catalysts** for  
 ammoxidn. to nicotinonitrile)

OSC.G 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD (4  
 CITINGS)

RE.CNT 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 12 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1996:40762 HCAPLUS Full-text  
 DN 124:98937  
 OREF 124:18281a,18284a  
 TI Oxidation and ammoxidation of picolines over **vanadium**  
~~silico-alumino-phosphate~~ molecular sieves

AU Kulkarni, S J.; Rao, R Ramachandra; Subrahmanyam, M.; Farsinavis,  
 S.; Rao, P Kanta; Rao, A V Rama  
 CS Indian Institute Chemical Technology, Hyderabad, 500 007, India  
 SO Studies in Surface Science and Catalysis (1995),  
 98(Zeolite Science 1994: Recent Progress and Discussions), 161-2  
 CODEN: SSCTDM; ISSN: 0167-2991

PB Elsevier  
 DT Journal  
 LA English

AB The oxidation and ammoxidn. of 3- and 4-picolines over **vanadium**  
~~silico-alumino-phosphate~~ and **vanadium**-alumino- ~~phosphate~~ mol. sieves  
 lead to corresponding 60-85% yields of aldehydes and nitriles. We  
 report crystalline and microporous modified (V-) silico-alumino-  
 phosphates as a new class of oxidation and ammoxidn. **catalytic**  
 materials.

CC 67-2 (Catalysis, Reaction Kinetics, and Inorganic Reaction  
 Mechanisms)  
 Section cross-reference(s): 22, 27

ST oxidn ammoxidn picoline vanadium silicoaluminophosphate  
**catalyst**; aluminophosphate vanadium **catalyst** oxidn  
 ammoxidn picoline; VSAPO **catalyst** oxidn ammoxidn picoline;  
 VAPO **catalyst** oxidn ammoxidn picoline

IT Ammoxidation  
 (mechanism; oxidation and ammoxidn. of picolines over  
~~vanadium-silico-alumino-phosphate~~ mol. sieves)

IT Ammoxidation **catalysts**  
 Oxidation **catalysts**  
 (oxidation and ammoxidn. of picolines over **vanadium**  
~~silico-alumino-phosphate~~ mol. sieves)

IT Zeolites, uses

RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
 (vanadium silicoaluminophosphate; oxidation and ammoxidn. of  
 picolines over **vanadium**-silico-alumino-

phosphate mol. sieves)

IT Zeolites, uses  
 RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
 (vanadium aluminophosphate (VAPO), oxidation and ammoxidn. of  
 picolines over **vanadium-silico-alumino-**  
 phosphate mol. sieves)

IT 108-89-4, 4-Picoline 108-99-6, 3-  
 Picoline  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidation and ammoxidn. of picolines over **vanadium**  
 -silico-alumino-phosphate mol. sieves)

OSC.G 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS RECORD (7  
 CITINGS)

L44 ANSWER 13 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1995:534201 HCAPLUS Full-text  
 DN 123:83313  
 OREF 123:14909a,14912a

TI Vanadium phosphorus oxide **catalyst** for ammoxidations of  
 3-picoline to nicotinonitrile and 2-methylpyrazine  
 to 2-cyanopyrazine

AU Reddy, B. Mahipal; Kumar, M. Vijaya; Manohar, B.  
 CS Indian Institute Chemical Technology, Hyderabad, 500 007, India  
 SO Chemical Industries (Dekker) (1995), 62(Catalysis of  
 Organic Reactions), 487-91  
 CODEN: CHEIDI; ISSN: 0737-8025

PB Dekker  
 DT Journal  
 LA English

AB Ammoxidns. of 3-picoline to nicotinonitrile and 2-methylpyrazine to  
 2-cyanopyrazine were investigated both on conventional molybdena-  
 vanadia/alumina **catalyst** and on non-conventional vanadium phosphorus  
 oxides (VPOs) of different origin. The VPO **catalyst** supported on  
 silica shows good performance. The **catalytic** activity is correlated  
 well with the physicochem. characteristics of the **catalyst**.

CC 28-17 (Heterocyclic Compounds (More Than One Hetero Atom))  
 Section cross-reference(s): 27, 67

ST ammoxidn **catalyst** vanadium phosphorus oxide; picoline  
 ammoxidn **catalyst**; methylpyrazine ammoxidn  
**catalyst**; nicotinonitrile; pyrazine cyano

IT Ammoxidation **catalysts**  
 (vanadium phosphorus oxide **catalyst** for ammoxidns. of  
 picoline to nicotinonitrile and methylpyrazine to cyanopyrazine)

IT 65506-75-4, Vanadium phosphorus oxide  
 RL: CAT (Catalyst use); USES (Uses)  
 (vanadium phosphorus oxide **catalyst** for ammoxidns. of  
 picoline to nicotinonitrile and methylpyrazine to cyanopyrazine)

IT 108-99-6, 3-Picoline 109-08-0,  
2-Methylpyrazine  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(vanadium phosphorus oxide **catalyst** for ammoxidns. of  
picoline to nicotinonitrile and methylpyrazine to cyanopyrazine)

IT 100-54-9P, Nicotinonitrile 19847-12-2P, 2-Cyanopyrazine  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(vanadium phosphorus oxide **catalyst** for ammoxidns. of  
picoline to nicotinonitrile and methylpyrazine to cyanopyrazine)

OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1  
CITINGS)

L44 ANSWER 14 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 1992:255487 HCAPLUS Full-text  
DN 116:255487  
OREF 116:43315a,43318a  
TI Ammoxidation of methyl substituted heteroaromatics to make  
heteroaromatic nitriles  
IN Dicosimo, Robert; Burrington, James D.; Grasselli, Robert K.  
PA Standard Oil Co., USA  
SO U.S., 4 pp. Cont.-in-part of U.S. Ser. No. 559,511, abandoned.  
CODEN: USXXAM  
DT Patent  
LA English  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	US 5028713	A	19910702	US 1986-925932	198611 03

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PRAI US 1983-559511 B2 19831208 <--  
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT  
OS CASREACT 116:255487  
AB Ammoxidn. **catalysts** for 3- and 4-methylpyridine have the formula  
PaVbMocMdOx (M = Sb, Fe, W, Cu, K, Cs, Sn, Mn, Zr, Nb, U, Bi, Cr; a =  
0.1-3; b = 0.1-6; a + b  $\geq$  1.5; c = 12; d = 0-4; x = atoms required to  
satisfy the valences of the other elements). The **catalysts** may also  
contain 0-0.2 atoms of Te, Se, and/or Zr and 0-0.5 atoms of Fe, Co,  
or Ni. Thus, PV4Mo12Ox on SiO2 was prepared from NH4VO3, H3PO4, and  
(NH4)5Mo7O24 and was used for the ammoxidn. of 3-methylpyridine at  
380° with a residence time of 2.5 s. to give 95% 3-cyanopyridine at  
99% conversion.

IC ICM C07D213-57  
INCL 546286000  
CC 27-16 (Heterocyclic Compounds (One Hetero Atom))

ST methylpyridine ammoxidn molybdenum catalyst; cyanopyridine  
 IT Ammoxidation catalysts  
 (for methylpyridines)  
 IT 108-89-4, 4-Methylpyridine 108-99-6, 3-Methylpyridine  
 RL: PROC (Process)  
 (ammoxidn. of, catalysts for)  
 IT 128177-07-1 156166-12-0, Molybdenum vanadium oxide  
 phosphate  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst, for ammoxidn. of Me pyridines)  
 IT 100-48-1P, 4-Cyanopyridine 100-54-9P, 3-Cyanopyridine  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of, from methylpyridine, catalysts for)  
 OSC.G 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3  
 CITINGS)  
 RE.CNT 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 15 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1992:154188 HCAPLUS Full-text  
 DN 116:154188  
 OREF 116:26081a,26084a  
 TI Ammoxidation of 3-picoline to nicotinonitrile on  
 silica-supported vanadium phosphorus oxide (VPO)  
 catalyst  
 AU Reddy, Benjaram M.; Manohar, Basude  
 CS Catal. Sect., Indian Inst. Chem. Technol., Hyderabad, 500 007, India  
 SO Chemistry & Industry (London, United Kingdom) (1992), (5),  
 182-3  
 CODEN: CHINAG; ISSN: 0009-3068  
 DT Journal  
 LA English  
 AB The title ammoxidn. over VPO/SiO2 catalyst at 1 atm and space  
 velocity 3946 h-1 occurred at 90% conversion and 93% selectivity,  
 compared to 42 and 81, 67 and 89, and 68 and 69% for aqueous VPO,  
 organic VPO, and MoO3-V2O5/Al2O3 catalysts, resp. The title catalyst  
 had average V oxidation state 4.33 and generally contained an  
 amorphous VPO phase and well crystallized (VO)2P2O7.  
 CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 27  
 ST ammoxidn picoline nicotinonitrile selectivity; vanadyl phosphate  
 catalyst ammoxidn  
 IT Ammoxidation catalysts  
 (vanadium phosphorus oxide, on silica, for picoline to  
 nicotinonitrile)  
 IT 108-99-6, 3-Picoline  
 RL: USES (Uses)

(ammoxidn. of, to nicotinonitrile, vanadium phosphorus oxide-silica **catalysts** for)

IT 58834-75-6 65506-75-4, Phosphorus vanadium oxide  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalysts, on silica, for ammoxidn. of picoline to nicotinonitrile)

IT 100-54-9P, Nicotinonitrile  
 RL: PREP (Preparation)  
 (production of, by ammoxidn. of picoline, vanadium phosphorus oxide-silica **catalysts** for)

IT 7631-86-9, Silica, uses  
 RL: USES (Uses)  
 (vanadium phosphorus oxide **catalysts** containing, for ammoxidn. of picoline to nicotinonitrile)

OSC.G 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD (4 CITINGS)

L44 ANSWER 16 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 1990:559889 HCAPLUS Full-text

DN 113:159889

OREF 113:27043a,27046a

TI Methods for preparing **vanadium phosphate** heterogeneous **catalysts**

IN Martin, Andreas; Ladwig, Gerhard; Luecke, Bernhard; Seeboth, Helmuth

PA Akademie der Wissenschaften der DDR, Ger. Dem. Rep.

SO Ger. (East), 5 pp.

CODEN: GEXXA8

DT **Patent**

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	DD 274983	A1	19900110	DD 1987-311018	198712 22

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PRAI DD 1987-311018 19871222 <--

OS CASREACT 113:159889

AB Methods for producing **catalysts** containing (NH<sub>4</sub>)<sub>2</sub>(VO)<sub>3</sub>(P<sub>2</sub>O<sub>7</sub>), which are useful in the manufacture of aromatic and heteroarom. nitriles by gas-phase ammoxidn. of Me aroms. and Me heteroaroms., entail producing the crystalline intermediate (NH<sub>4</sub>)<sub>2</sub>(VO<sub>2</sub>)(HPO<sub>4</sub>)<sub>2</sub>(C<sub>2</sub>O<sub>4</sub>).nH<sub>2</sub>O (n = 0-5), by carrying out a redox reaction involving a V+5 compound in a heated aqueous solution in the presence of phosphoric and oxalic acids with the addition of NH<sub>3</sub>, and then heat-treating the intermediate in a Me aromatic and/or Me heteroarom. compound-, O-,



- and optionally steam-containing gas flow at 250-600° to produce the catalyst.
- IC ICM B01J027-198  
ICS C07C120-14
- CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
Section cross-reference(s): 25, 45
- ST ammoxidn catalyst prepn; ammonium oxovanadium diphosphate catalyst prepn; vanadium phosphate catalyst prepn; heterogeneous catalyst prepn
- IT Ammoxidation catalysts  
(ammonium oxovanadium diphosphate, preparation of)
- IT Nitriles, preparation  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(aromatic and heteroarom., preparation of, vanadium phosphate catalyst preparation for)
- IT Catalysts and Catalysis  
(heterogeneous, ammonium oxovanadium diphosphate, preparation of)
- IT 95-49-8 106-38-7 106-43-4, p-Chlorotoluene 108-88-3, reactions 108-89-4 108-99-6, 3-Picoline  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(ammoxidn. of, preparation of catalyst for)
- IT 129496-78-2P  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(preparation and reaction of, in ammonium oxovanadium diphosphate catalyst preparation)
- IT 110779-76-5P  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of, as heterogeneous catalyst)
- IT 623-03-0P  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of, by ammoxidn., preparation of catalyst for)
- IT 144-62-7, Ethanedioic acid, reactions 1314-62-1, Vanadium oxide (V2O5), reactions 7664-38-2, Phosphoric acid, reactions 7664-41-7, Ammonia, reactions 7803-55-6  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of, in ammonium oxovanadium diphosphate catalyst preparation)
- L44 ANSWER 17 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 1989:459953 HCAPLUS Full-text  
DN 111:59953  
OREF 111:10165a,10168a  
TI Ammoxidation of picolines on vanadium phosphate catalysts  
AU Martin, A.; Luecke, B.; Seeboth, H.; Ladwig, G.

CS Cent. Inst. Org. Chem., Acad. Sci., Berlin, 1199, Ger. Dem. Rep.  
 SO Applied Catalysis (1989), 49(2), 205-11  
 CODEN: APCADI; ISSN: 0166-9834  
 DT Journal  
 LA English  
 AB The ammoxidn. of the three isomeric picolines to cyanopyridines on crystalline V phosphate catalysts was investigated.  $\alpha$ -VOP04 was used as the catalyst precursor; it was transformed into a highly active catalyst during the time onstream. In the optimum temperature range a high picoline conversion with high selectivities of the generated nitriles was observed  
 CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 ST picoline ammoxidn cyanopyridine prodn; vanadyl phosphate catalyst ammoxidn  
 IT Ammoxidation catalysts  
     (vanadyl phosphate, for picolines, optimization in relation to)  
 IT 108-89-4, 4-Picoline 108-99-6, 3-Picoline 109-06-8, 2-Picoline  
 RL: PROC (Process)  
     (ammoxidn. of, to cyanopyridine, vanadyl phosphate catalysts for)  
 IT 12359-27-2, Vanadyl phosphate (VOP04)  
 RL: CAT (Catalyst use); USES (Uses)  
     (catalysts, for ammoxidn. of picolines to cyanopyridines)  
 IT 100-48-1P, 4-Cyanopyridine 100-54-9P, 3-Cyanopyridine 100-70-9P, 2-Cyanopyridine  
 RL: PREP (Preparation)  
     (production of, by ammoxidn. of picoline, vanadyl phosphate catalysts for)  
 OSC.G 34 THERE ARE 34 CAPLUS RECORDS THAT CITE THIS RECORD (34 CITINGS)  
 L44 ANSWER 18 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1989:233611 HCAPLUS Full-text  
 DN 110:233611  
 OREF 110:38732h,38733a  
 TI Ammoxidation catalysts for manufacture of aromatic and hetero aromatic nitriles from methyl-substituted precursors  
 IN Luecke, Bernhard; Martin, Andreas; Seeboth, Helmuth; Ladwig, Gerhard; Parltitz, Barbara; French, Juergen  
 PA Akademie der Wissenschaften der DDR, Ger. Dem. Rep.  
 SO Ger. (East), 6 pp.  
 CODEN: GEXXA8  
 DT Patent  
 LA German  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI DD 256129	A1	19880427	DD 1985-274902	198504 04
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PRAI DD 1985-274902		19850404	<--	
AB	The title <b>catalysts</b> contain a V phosphate such as (NH <sub>4</sub> ) <sub>2</sub> (VO) <sub>3</sub> (P <sub>2</sub> O <sub>7</sub> ) <sub>2</sub> or (VO) <sub>2</sub> P <sub>2</sub> O <sub>7</sub> and give high product yields and space-time yields. Tablets containing VOP <sub>4</sub> ·2H <sub>2</sub> O were heated in air at 200° to remove water of hydration, placed in a tubular reactor, and used at 440° (residence time 1.0 s) for the ammoxidn. of p-methoxytoluene, giving 89.9% conversion with a 67.6% yield of p-methoxybenzonitrile and a space-time yield of 62.0 g/L <b>catalyst/h</b> .			
IC	ICM C07C120-14 ICS B01J027-18; C07C121-52; C07D213-84			
CC	45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes) Section cross-reference(s): 25, 27			
ST	nitrile manuf ammoxidn <b>catalyst</b> ; benzonitrile manuf toluene ammoxidn; heterocycle nitrile manuf ammoxidn; <b>vanadium phosphate</b> ammoxidn <b>catalyst</b>			
IT	Ammoxidation <b>catalysts</b> ( <b>vanadium phosphates</b> , for methylarenes to nitriles)			
IT	Nitriles, preparation RL: PREP (Preparation) (aryl, manufacture of, ammoxidn. <b>catalysts</b> for)			
IT	Nitriles, preparation RL: PREP (Preparation) (heterocyclic, manufacture of, ammoxidn. <b>catalysts</b> for)			
IT	95-49-8, 2-Chlorotoluene 100-84-5, m-Methoxytoluene 104-93-8, 4-Methoxytoluene 106-38-7, 4-Bromotoluene 106-43-4, 4-Chlorotoluene 108-41-8, 3-Chlorotoluene 108-88-3, Toluene, reactions 108-89-4, 4-Picoline 108-99-6, 3-Picoline 109-06-8 578-58-5, o-Methoxytoluene RL: PROC (Process) (ammoxidn. of, to nitrile)			
IT	12054-39-6 12359-27-2 45021-28-1 58834-75-6 70599-09-6 109799-88-4 110779-76-5 RL: CAT (Catalyst use); USES (Uses) ( <b>catalysts</b> , for ammoxidn. of methylarenes to nitriles)			
IT	100-47-0P, Benzonitrile, preparation 100-48-1P, 4-Cyanopyridine 100-54-9P, 3-Cyanopyridine 100-70-9P, 2-Cyanopyridine 623-00-7P, 4-Bromobenzonitrile 623-03-0P, 4-Chlorobenzonitrile 766-84-7P, 3-Chlorobenzonitrile 873-32-5P, 2-Chlorobenzonitrile 874-90-8P, 4-Methoxybenzonitrile 1527-89-5P, 3-Methoxybenzonitrile			

6609-56-9P, 2-Methoxybenzonitrile

RL: PREP (Preparation)

(manufacture of, amnoxidn. catalysts for)

L44 ANSWER 19 OF 20 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 1988:454666 HCAPLUS Full-text

DN 109:54666

OREF 109:9215a,9218a

TI Process for preparing heteroaromatic nitriles useful as starting materials for preparation of medicines or agricultural chemicals

IN Shimizu, Shinkichi; Shoji, Takayuki; Abe, Nobuyuki; Doba, Masanori; Taguro, Akira; Iguchi, Akira; Nakaishi, Toru

PA Koei Chemical Co., Ltd., Japan

SO Eur. Pat. Appl., 18 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 253360	A2	19880120	EP 1987-110158	19870714
EP 253360	A3	19890503		
EP 253360	B1	19931201		
R: BE, DE, IT				
JP 63072675	A	19880402	JP 1986-218485	19860916
JP 63152360	A	19880624	JP 1987-176888	19870715
JP 07049419	B	19950531		
US 4778890	A	19881018	US 1987-75037	19870716
JP 1986-165767	A	19860715		
JP 1986-183255	A	19860804		
JP 1986-218485	A	19860916		

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

OS CASREACT 109:54666

- AB The title compds. were prepared by **catalytically** subjecting an alkyl-substituted heteroarom. compound to ammoxidn. ( $\text{O}_2\text{-NH}_3 = 1.6:1$  in a gaseous phase). The **catalyst**, a vanadium-phosphorus oxide  $\text{VP}_x\text{Sb}_y\text{O}_z$  ( $i$ ;  $x, y, z$  is the atomic ratio of P, Sb, and O to V, resp., and  $x = 0.1\text{-}5, y = 0\text{-}8$ , and  $z$  is defined from the valencies of other elements) was also prepared.  $\text{NH}_4\text{VO}_3$  in  $\text{H}_2\text{O}$  and 85%  $\text{H}_3\text{PO}_4$  were reacted at  $110^\circ$  for 8 h, followed by calcination at  $500^\circ$  for 4 h in the air to give  $\beta\text{-VOPO}_4$ . Heating  $\beta\text{-VOPO}_4$  in a reactor at  $420^\circ$ , a gaseous mixture of 4-methylpyridine,  $\text{NH}_3$ , air and steam (molar ratio =  $1:15:75:10$ ) was flowed at a space velocity of  $3000\text{ h}^{-1}$  to give 4-cyanopyridine 81.5% and a conversion of 4-methylpyridine 99.4%.
- IC ICM C07D213-84  
ICS C07D241-24
- CC 27-16 (Heterocyclic Compounds (One Hetero Atom))  
Section cross-reference(s): 1, 5, 28, 67
- ST heteroarom nitrile; alkylpyridine ammoxidn **catalyst**  
nitriloheteroarom; nitriloheteroarom prepn intermediate agrochem  
pharmaceutical; pyridinenitrile prepn intermediate agrochem  
pharmaceutical; pyrazinenitrile prepn intermediate agrochem
- IT Ammoxidation **catalysts**  
(vanadium-phosphorus oxide, for alkylpyrazines and -pyridines)
- IT 108-89-4, 4-Methylpyridine **108-99-6**, 3-Methylpyridine  
109-06-8, 2-Methylpyridine 109-08-0, Methylpyrazine 591-22-0,  
3,5-Dimethylpyridine  
RL: PROC (Process)  
(ammoxidn. of, **catalysts** for)
- IT 12293-87-7P 12359-27-2P 58834-75-6P 115493-46-4P, Antimony  
vanadium oxide **phosphate** ( $\text{Sb}_2\text{VO}_4.22(\text{PO}_4)0.85$ )  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of, as ammoxidn. **catalysts**, for heteroarom.  
nitriles)
- IT 1309-64-4, Antimony trioxide, reactions 7664-38-2, Phosphoric  
acid, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of, with ammonium metavanadate, **catalysts**  
from)
- IT 1314-62-1, Vanadium pentoxide, reactions 7803-55-6, Ammonium  
metavanadate  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of, with phosphoric acid, **catalysts** from)
- IT 7722-76-1, Ammonium dihydrogen phosphate  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of, with vanadium pentoxide, **catalysts** from)
- OSC.G 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3  
CITINGS)

AN 1983:52937 HCAPLUS Full-text  
 DN 98:52937  
 OREF 98:8125a,8128a  
 TI Characteristics of the mechanism of vapor-phase oxidation of  
 methylpyridines on **vanadium phosphates**  
 AU Skolmeister, R. A.; Leitis, L.; Shimanskaya, M. V.; Geodrovics, J.;  
 Konstants, Z.  
 CS USSR  
 SO Mekhanizm Katalit. Reaktsii. Materialy 3 Vses. Konf., Novosibirsk ( 1982), (Ch 2), 164-7  
 From: Ref. Zh., Khim. 1982, Abstr. No. 20B1156  
 DT Journal  
 LA Russian  
 AB Title only translated.  
 CC 22-7 (Physical Organic Chemistry)  
 Section cross-reference(s): 67  
 IT Oxidation **catalysts**  
 (vanadium polyphosphates, for methylpyridines)  
 IT Polyphosphoric acids  
 RL: PRP (Properties)  
 (vanadium salts, **catalysts**, for oxidation of  
 methylpyridines)  
 IT 7440-62-2D, polyphosphates  
 RL: CAT (Catalyst use); USES (Uses)  
 (**catalysts**, for oxidation of methylpyridines)  
 IT 108-89-4 108-99-6 109-06-8  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidation of, on vanadium polyphosphates, mechanism of)

=> d 147 1-4 bib abs fhitstr hitind

L47 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2004:718421 HCAPLUS Full-text

DN 141:224880

TI **Catalyst** for methacrylic acid synthesis

IN Sudo, Atsushi; Seo, Yoshimasa; Sugi, Hideki

PA Nippon Kayaku Kabushiki Kaisha, Japan

SO PCT Int. Appl., 53 pp.

CODEN: PIXXD2

DT **Patent**

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	WO 2004073857	A1	20040902	WO 2004-JP1999
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200402  
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W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA,  
CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP,  
KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NA, NI

RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT,  
BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,  
IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI,  
CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

EP 1595600 A1 20051116 EP 2004-713199

200402  
20

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R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,  
SK

BR 2004007442 A 20060131 BR 2004-7442

200402  
20

&lt;--

CN 1750878 A 20060322 CN 2004-80004485

200402  
20

&lt;--

CN 100457264 C 20090204  
MX 2005008754 A 20051005 MX 2005-8754

200508  
17

&lt;--

ZA 2005007363 A 20061025 ZA 2005-7363

200509  
13

&lt;--

US 20060154811 A1 20060713 US 2005-545699

200510  
03

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PRAI JP 2003-42259 A 20030220 <--  
WO 2004-JP1999 W 20040220 <--

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The invention refers to a **catalyst** for producing methacrylic acid in a high yield with high selectivity by **catalytically** oxidizing methacrolein, isobutyraldehyde, or isobutyric acid in a vapor phase. The **catalyst** comprises a heteropolyacid salt comprising a

heteropolyacid containing Mo, V, P, Cu, Cs, and NH<sub>4</sub> as essential active ingredients. A weak-acid salt of Cs or CsOH was used as a source of Cs in the active **catalyst** ingredient and ammonium acetate was used as an NH<sub>4</sub> source. The coated **catalyst** was obtained by supporting the active ingredient on an inactive **support** such as alumina.

IT 182616-75-7, Ammonium cesium copper molybdenum phosphorus vanadium oxide  
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
 (catalyst for methacrylic acid synthesis)  
 RN 182616-75-7 HCAPLUS  
 CN Ammonium cesium copper molybdenum phosphorus vanadium oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
H4N	x	14798-03-9
P	x	7723-14-0
V	x	7440-62-2
Cu	x	7440-50-8
Cs	x	7440-46-2
Mo	x	7439-98-7

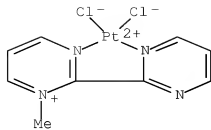
IC ICM B01J027-24  
 ICS B01J037-08; B01J037-16; C07C057-05; C07C051-235; C07C051-377  
 CC 21-2 (General Organic Chemistry)  
 Section cross-reference(s): 67  
 ST oxidn **catalyst** heteropolyacid molybdenum vanadium phosphorus copper cesium ammonium; methacrylic acid synthesis  
**catalyst** heteropoly acid salt  
 IT Oxidation **catalysts**  
 (catalyst for methacrylic acid synthesis)  
 IT Heteropoly acids  
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
 (catalyst for methacrylic acid synthesis)  
 IT Ceramics  
 (fibers; **catalyst** for methacrylic acid synthesis)  
 IT 1344-28-1, Alumina, uses 182616-75-7, Ammonium cesium copper molybdenum phosphorus vanadium oxide 745828-67-5  
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
 (catalyst for methacrylic acid synthesis)  
 IT 79-41-4P, Methacrylic acid, preparation  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (catalyst for methacrylic acid synthesis)  
 OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (2)



## CITINGS)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L47 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 2004:607057 HCAPLUS Full-text  
DN 141:297626  
TI Mild, Aqueous, Aerobic, Catalytic Oxidation of Methane to  
Methanol and Acetaldehyde Catalyzed by a Supported  
Bipyrimidinylplatinum-Polyoxometalate Hybrid Compound  
AU Bar-Nahum, Itsik; Khenkin, Alexander M.; Neumann, Ronny  
CS Department of Organic Chemistry, Weizmann Institute of Science,  
Rehovot, 76100, Israel  
SO Journal of the American Chemical Society (2004), 126(33),  
10236-10237  
CODEN: JACSAT; ISSN: 0002-7863  
PB American Chemical Society  
DT Journal  
LA English  
OS CASREACT 141:297626  
AB A bipyrimidinylplatinum-polyoxometalate,  
[Pt(Mebipym)Cl<sub>2</sub>]+[H<sub>4</sub>PV<sub>2</sub>Mo<sub>10</sub>O<sub>40</sub>]-, supported on silica is demonstrated  
as an active catalyst for the aerobic oxidation of methane to  
methanol in water under mild reaction conditions. Further oxidation  
of methanol yields acetaldehyde. The presence of the polyoxometalate  
is presumed to allow the facile oxidation of a Pt(II) intermediate to  
a Pt(IV) intermediate and to aid in the addition of methane to the Pt  
catalytic center.  
IT 763114-87-0P  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP  
(Preparation); USES (Uses)  
(synthesis of a supported bipyrimidinylplatinum-polyoxometalate  
hybrid compound for aerobic catalytic oxidation of methane)  
RN 763114-87-0 HCAPLUS  
CN Platinum(1+), dichloro(1-methyl-2,2'-bipyrimidinium-  
κN1',κN3)-, (SP-4-3)-, hydrogen  
(heptadeca-μ-oxodecaoxodecamolybdate)hepta-μ-oxodioxo[μ12-  
[phosphato(3-)-κO:κO:κO:κO':κO':κ  
.O':κO':κO':κO':κO':κO':κ  
O''']]divanadate(5-) (1:4:1) (9CI) (CA INDEX NAME)  
  
CM 1  
  
CRN 845963-47-5  
CMF C9 H9 Cl2 N4 Pt  
CCI CCS



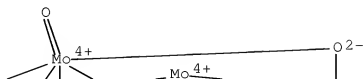
CM 2

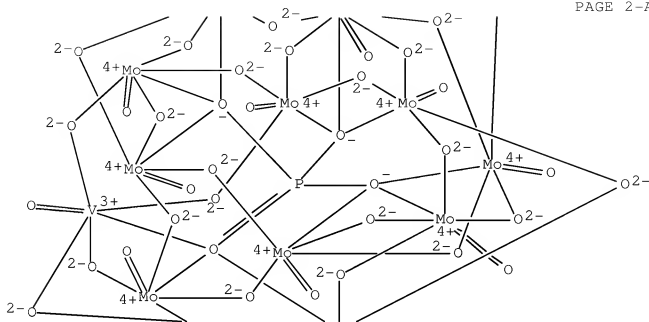
CRN 58071-93-5

CMF Mo10 O40 P V2

CCI CCS

PAGE 1-A





- CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 22, 67, 78
- ST bipyrimidinylplatinum polyoxometalate **catalyst** methane  
 aerobic oxidn
- IT Oxidation  
 (aerobic **catalytic** oxidation of methane to methanol and  
 acetaldehyde using a supported  
 bipyrimidinylplatinum-polyoxometalate hybrid compound)
- IT Transition metal complexes  
 RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP  
 (Preparation); USES (Uses)  
 (imine; synthesis of a supported

bipyrimidinylplatinum-polyoxometalate hybrid compound for aerobic catalytic oxidation of methane)

IT Oxidation catalysts  
(synthesis of a supported bipyrimidinylplatinum-polyoxometalate hybrid compound for aerobic catalytic oxidation of methane)

IT Imines  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(transition metal complexes; synthesis of a supported bipyrimidinylplatinum-polyoxometalate hybrid compound for aerobic catalytic oxidation of methane)

IT 67-56-1P, Methanol, preparation 75-07-0P, Acetaldehyde, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(aerobic catalytic oxidation of methane to methanol and acetaldehyde using a supported bipyrimidinylplatinum-polyoxometalate hybrid compound)

IT 74-82-8, Methane, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(aerobic catalytic oxidation of methane to methanol and acetaldehyde using a supported bipyrimidinylplatinum-polyoxometalate hybrid compound)

IT 7631-86-9, Silica, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst support; synthesis of a supported bipyrimidinylplatinum-polyoxometalate hybrid compound for aerobic catalytic oxidation of methane)

IT 77-78-1, Dimethyl sulfate 12293-21-9 15274-33-6, Bis(dimethylsulfoxide)dichloroplatinum 34671-83-5, 2,2'-Bipyrimidine  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(in synthesis of a supported bipyrimidinylplatinum-polyoxometalate hybrid compound for aerobic catalytic oxidation of methane)

IT 763114-87-0P  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(synthesis of a supported bipyrimidinylplatinum-polyoxometalate hybrid compound for aerobic catalytic oxidation of methane)

IT 68976-09-0P 845963-48-6P  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(synthesis of a supported bipyrimidinylplatinum-polyoxometalate hybrid compound for aerobic catalytic oxidation of methane)

OSC.G 47 THERE ARE 47 CAPLUS RECORDS THAT CITE THIS RECORD (47 CITINGS)

RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD

## ALL CITATIONS AVAILABLE IN THE RE FORMAT

L47 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 2001:628616 HCAPLUS Full-text  
 DN 135:195945  
 TI Oxidative dehydrogenation **catalyst** of alkanes and  
 manufacture of olefins and oxygenated compounds  
 IN Fujikawa, Nobuo; Tomita, Koji; Aoki, Akinobu  
 PA Idemitsu Petrochemical Co., Ltd., Japan; Japanese Association of  
 Chemical Industries  
 SO Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	JP 2001232207	A	20010828	JP 2000-47348	200002 24

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PRAI JP 2000-47348 20000224 <--  
 AB The **catalyst** includes heteropoly acids or their salts supported on  
 titania. A 1.5% H3PMo12O40/TiO2 **catalyst** was prepared and used for  
 dehydrogenate propane at 380° to give propylene with 63.3%  
 selectivity and 1.3% conversion.  
 IT 356583-49-8  
 RL: CAT (Catalyst use); USES (Uses)  
 (heteropoly acid oxidative dehydrogenation **catalyst** of  
 alkanes and manufacture of olefins and oxygenated compds.)  
 RN 356583-49-8 HCAPLUS  
 CN Molybdate(3-), tetracosam-μ-oxododecaoxo[μ12-(phosphato(3-)-  
 KO:KO:KO:KO':KO':KO':KO':  
 KO':KO':KO':KO':KO':KO']dodeca-,  
 ammonium vanadyl(2+) hydrogen (4:1:4:3) (9CI) (CA INDEX NAME)

CM 1

CRN 20644-97-7  
 CMF O V  
 CCI CCS

o==v2+

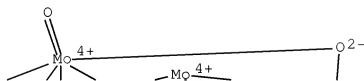
CM 2

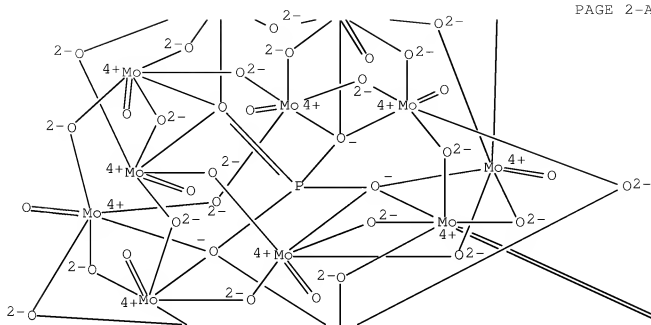
CRN 12379-13-4

CMF Mo12 O40 P

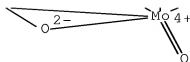
CCI CCS

PAGE 1-A





PAGE 3-A



PAGE 3-B



- IC ICM B01J027-19  
 ICS B01J023-28; B01J027-199; B01J032-00; C07C005-48; C07C011-06;  
 C07C027-12; C07C045-33; C07C047-22; C07C051-215; C07C053-08;  
 C07C057-05; C07B061-00
- CC 35-3 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 45
- ST oxidative dehydrogenation **catalyst** alkane olefin  
 oxygenate; propane dehydrogenation **catalyst** heteropoly  
 acid propylene
- IT Heteropoly acids  
 RL: CAT (Catalyst use); USES (Uses)  
 (heteropoly acid oxidative dehydrogenation **catalyst** of  
 alkanes and manufacture of olefins and oxygenated compds.)
- IT Alkanes, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (oxidative dehydrogenation **catalyst** of alkanes and  
 manufacture of olefins and oxygenated compds.)
- IT Dehydrogenation **catalysts**  
 (oxidative; oxidative dehydrogenation **catalyst** of  
 alkanes and manufacture of olefins and oxygenated compds.)
- IT 12026-57-2, Phosphomolybdic acid (H3PMo12040) 12027-12-2,  
 Molybdosilicic acid (H4SiMo12040) 12293-15-1,  
 Molybdovanadophosphoric acid (H4Mo11PVO40) 159395-49-0



356583-49-8 356583-50-1

RL: CAT (Catalyst use); USES (Uses)

(heteropoly acid oxidative dehydrogenation catalyst of alkanes and manufacture of olefins and oxygenated compds.)

IT 64-19-7P, Acetic acid, preparation 75-07-0P, Acetaldehyde, preparation 79-10-7P, Acrylic acid, preparation 107-02-8P, 2-Propenal, preparation 115-07-1P, Propene, preparation

RL: IMF (Industrial manufacture); PREP (Preparation)  
(oxidative dehydrogenation catalyst of alkanes and manufacture of olefins and oxygenated compds.)

IT 74-98-6, Propane, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(oxidative dehydrogenation catalyst of alkanes and manufacture of olefins and oxygenated compds.)

IT 13463-67-7, Titania, uses

RL: CAT (Catalyst use); USES (Uses)  
(support; oxidative dehydrogenation catalyst of alkanes and manufacture of olefins and oxygenated compds.)

L47 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 1997:789781 HCAPLUS Full-text

DN 128:27274

OREF 128:5265a,5268a

TI How does the support influence the catalytic activity of the Keggin ion?

AU Smith, Zakiyyah; Palmieri, Michael; Buecheler, Nancy; Jansen, Susan A.

CS Department of Chemistry, Temple University, Philadelphia, PA, 19122, USA

SO Materials Research Society Symposium Proceedings (1997), 454(Advanced Catalytic Materials--1996), 103-110

CODEN: MRSPDH; ISSN: 0272-9172

PB Materials Research Society

DT Journal

LA English

AB Heteropoly acids, HPA are well known solid acid and oxidation catalysts that find application in heterogeneous and homogeneous reactions. In the former, surface area and stability problems are diminished by supporting the HPA. Typical supports include oxide substrates and porous carbon materials. The HPA's show some instability on these supports however. In this work, we demonstrate that HPA encapsulated in sol-gel silica matrixes show enhanced catalytic performance without compromising the catalytic activity of the HPA. In addition, the specific role of the support in the catalytic process is described as well.

IT 199486-42-5

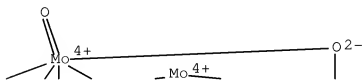
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)

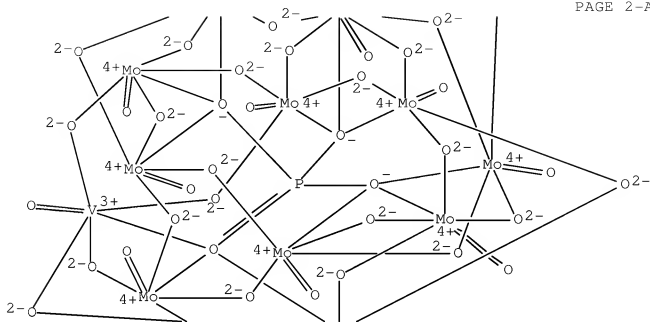
	(support influence on catalytic activity of Keggin ion)
RN	199486-42-5 HCAPLUS
CN	Ethanaminium, N,N,N-triethyl-, (heptadeca- $\mu$ -oxodecaoxodecamolybdate)hepta- $\mu$ -oxodioxo[ $\mu$ 12- [phosphato(3-)-KO:KO:KO:KO':KO':.kappa .O':KO':.KO':.KO':.KO':.KO':.K O''']]divanadate(5-) (5:1) (9CI) (CA INDEX NAME)

CM 1

CRN 58071-93-5  
CMF Mo10 O40 P V2  
CCI CCS

PAGE 1-A





CM 2

CRN 66-40-0

CMF C8 H20 N



CC 67-1 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)

ST support influence **catalytic** activity Keggin ion; silica influence **catalytic** activity heteropoly acid

IT Oxidation  
(**catalytic**, for ethanol; support influence on **catalytic** activity of Keggin ion)

IT Oxidation **catalysts**  
(for ethanol; support influence on **catalytic** activity of Keggin ion)

IT **Catalyst** supports  
(support influence on **catalytic** activity of Keggin ion)

IT Heteropoly acids  
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
(support influence on **catalytic** activity of Keggin ion)

IT 7631-86-9, **Silica**, uses 12293-21-9 199486-42-5 199486-43-6  
RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
(support influence on **catalytic** activity of Keggin ion)

OSC.G 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> d 149 1-4 bib abs fhitr hitind

L49 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2003:242315 HCAPLUS Full-text

DN 138:271525

TI Oxidative process and catalysts for the preparation of 2,5-diformylfuran from carbohydrates

IN Grushin, Vladimir; Herron, Norman; Halliday, Gary Alan

PA E. I. Du Pont de Nemours & Co., USA

SO PCT Int. Appl., 19 pp.  
CODEN: PIXXD2

DT Patent  
LA English  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	WO 2003024947	A1	20030327	WO 2002-US29464	

200209  
17

&lt;--

W: CN, JP, KR  
 RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE,  
 IT, LU, MC, NL, PT, SE, SK, TR  
 US 20030130528 A1 20030710 US 2002-243337

200209  
13

&lt;--

US 6706900 B2 20040316  
 EP 1427715 A1 20040616 EP 2002-763644

200209  
17

&lt;--

EP 1427715 B1 20060517  
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
 PT, IE, FI, CY, TR, BG, CZ, EE, SK  
 CN 1555368 A 20041215 CN 2002-818206

200209  
17

&lt;--

JP 2005506984 T 20050310 JP 2003-528795

200209  
17

&lt;--

PRAI US 2001-322629P P 20010917 <--  
 WO 2002-US29464 W 20020917 <--  
 ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT  
 OS CASREACT 138:271525

AB 2,5-Diformylfuran is prepared from a source of fructose in a one-pot, two-step reaction, in a single solvent system process, using a vanadium catalyst, by (a) combining a source of a carbohydrate (e.g., fructose) with a first solvent (e.g., DMF); (b) heating the reaction mixture of step (a) at a temperature sufficient to form 2,5-(hydroxymethyl)furfural; (c) adding an oxidant (e.g., air) and a catalytic amount of vanadium (e.g., V2O5) to the reaction mixture of step (b); and (d) heating the reaction mixture of step (c) at a temperature to form 2,5-diformylfuran without adding an addnl. solvent after steps (b), (c), or (d).

IT 192226-76-9P

RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (oxidation catalyst for the preparation of 2,5-diformylfuran from carbohydrates)

RN 192226-76-9 HCAPLUS

CN Vanadate(4-), bis[μ-(diphosphato(4-)-

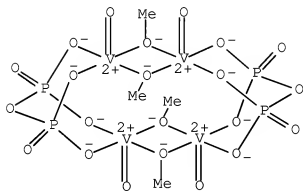
$\text{K}^+\text{O}^-\text{:K}^+\text{O}^-\text{:K}^+\text{O}^-\text{:K}^+\text{O}^-]$ tetra- $\mu$ -methoxytetraoxotetra-, stereoisomer, tetrahydrogen, compd. with 2,4,6-trimethylpyridine (1:4) (9CI) (CA INDEX NAME)

CM 1

CRN 192226-75-8

CMF C4 H12 O22 P4 V4 . 4 H

CCI CCS

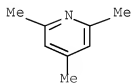


● 4 H<sup>+</sup>

CM 2

CRN 108-75-8

CMF C8 H11 N



IC ICM C07D307-46  
ICS C07D307-50

CC 27-6 (Heterocyclic Compounds (One Hetero Atom))  
 Section cross-reference(s): 45, 67

IT 54983-07-2P, Vanadyl metaphosphate (VO(PO<sub>3</sub>)<sub>2</sub>) 192226-76-9P  
 503315-65-9P  
 RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP  
 (Preparation); USES (Uses)  
 (oxidation catalyst for the preparation of 2,5-diformylfuran  
 from carbohydrates)

IT 7631-86-9, Silica, uses  
 RL: CAT (Catalyst use); PEP (Physical, engineering or chemical  
 process); PYP (Physical process); PROC (Process); USES (Uses)  
 (support; oxidation catalyst for the preparation of  
 2,5-diformylfuran from carbohydrates)

OSC.G 5 THERE ARE 5 CAPLUS RECORDS THAT CITE THIS RECORD (7  
 CITINGS)

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L49 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1999:487134 HCAPLUS Full-text  
 DN 131:116650  
 TI Vanadium catalysts and their precursor cluster compounds for  
 oxidation of butane  
 IN Herron, Norman; Thorn, David Lincoln  
 PA E. I. Du Pont de Nemours & Co., USA  
 SO U.S., 9 pp.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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	-----				
PI	US 5932746	A	19990803	US 1997-847411	199704 28

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PRAI US 1996-16398P P 19960429 <--  
 ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

OS MARPAT 131:116650

AB Readily processible cluster compns. of V and P are precursors to V-P  
 catalysts including vanadyl pyrophosphate and vanadyl  
 bis(metaphosphate). Thus, under an inert N atmospheric, 0.47 g  
 vanadyl sulfate was dissolved into 3 mL 2,4,6-trimethylpyridine and 7  
 mL MeOH, the solution was warmed to almost boiling, and a second  
 solution of 0.18 g pyrophosphoric acid in 5 mL MeOH was added with  
 stirring, the deep blue clear solution was boiled for 5 min, and

cooled slowly overnight to give bright blue crystals, which upon calcination  $>700^{\circ}$  formed well-crystallized vanadyl pyrophosphate (VO)<sub>2</sub>P<sub>2</sub>O<sub>7</sub>.

IT 192226-76-9P

RL: CAT (Catalyst use); IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)

(preparation and characterization by x-ray diffraction; vanadium catalysts and precursor cluster compds. for oxidation of butane)

RN 192226-76-9 HCAPLUS

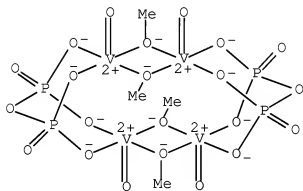
CN Vanadate(4-), bis[ $\mu$ -[diphosphato(4-)-  
 $\kappa O, \kappa O'' : \kappa O', \kappa O'''$ ]]tetra- $\mu$ -  
 methoxytetraoxotetra-, stereoisomer, tetrahydrogen, compd. with  
 2,4,6-trimethylpyridine (1:4) (9CI) (CA INDEX NAME)

CM 1

CRN 192226-75-8

CMF C4 H12 O22 P4 V4 . 4 H

CCI CCS



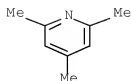
● 4 H<sup>+</sup>

CM 2

CRN 108-75-8

CMF C8 H11 N





IC ICM C07D307-34  
 ICS B01J027-198; B01J023-16  
 INCL 549260000  
 CC 35-2 (Chemistry of Synthetic High Polymers)  
 Section cross-reference(s): 45, 67  
 IT 192226-76-9P 192226-83-8P  
 192332-65-3P  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); RCT  
 (Reactant); PREP (Preparation); RACT (Reactant or reagent); USES  
 (Uses)  
 (preparation and characterization by x-ray diffraction; vanadium  
 catalysts and precursor cluster compds. for oxidation of  
 butane)  
 IT 1306-38-3, Ceria, uses 1314-23-4, Zirconia, uses  
 7631-86-9, Silica, uses 13463-67-7, Titania,  
 uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (support for vanadium phosphorous cluster; vanadium  
 catalysts and precursor cluster compds. for oxidation of butane)  
 OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2  
 CITINGS)  
 RE.CNT 28 THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT  
 L49 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2010 ACS on STN  
 AN 1991:9136 HCAPLUS Full-text  
 DN 114:9136  
 OREF 114:1710h,1711a  
 TI Manufacture of crystalline ammonium hydrogen  
 phosphate-oxalate-oxovanadium pentahydrate  
 IN Ladwig, Gerhard; Oliev, Elke; Martin, Andreas; Luecke, Bernhard;  
 Seeboth, Helmuth  
 PA Akademie der Wissenschaften der DDR, Ger. Dem. Rep.  
 SO Ger. (East), 3 pp.  
 CODEN: GEXXA8  
 DT Patent  
 LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DD 281171	A5	19900801	DD 1987-311021	198712 22

PRAI DD 1987-311021 19871222 &lt;--

AB The  $(\text{NH}_4)_2(\text{VO})_2(\text{HPO}_4)_2(\text{C}_2\text{O}_4) \cdot 5\text{H}_2\text{O}$  (I) is manufactured by dissolving a V(V) compound in a hot ( $70^\circ$  to b.p.) aqueous solution of  $\text{H}_3\text{PO}_4$  and  $\text{H}_2\text{C}_2\text{O}_4$  and, optionally,  $\text{H}_2\text{SO}_4$ , reacting the solution with  $\text{NH}_4\text{OH}$  to obtain N/V/P/C atomic ratio (1-3.5):1:(1-3):(1-3), and recovering and drying the resulting crystalline precipitate. The I is especially suitable for the manufacture of heterogeneous V phosphate catalysts or as inorg. ion exchanger. The V(V) compound may be  $\text{V}_2\text{O}_5$  or  $\text{NH}_4\text{VO}_3$ . A catalyst support or inert material,  $\text{SiO}_2$  and/or  $\text{Al}_2\text{O}_3$ , may be added to the crystallization solution.

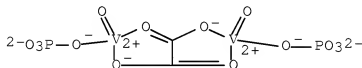
IT 129496-78-2P

RL: PREP (Preparation)

(manufacture of crystalline, for heterogeneous vanadium phosphate catalysts)

RN 129496-78-2 HCAPLUS

CN Vanadate(4-),  $[\mu\text{-}[\text{ethanedioato}(2-)\text{-}\kappa\text{O}1,\kappa\text{O}2':\kappa\text{O}1',\kappa\text{O}2]]\text{dioxobis}[\text{phosphato}(3-)\text{-}\kappa\text{O}] \text{di-}, \text{diammonium dihydrogen (9CI)} \quad (\text{CA INDEX NAME})$

●2  $\text{H}^+$ ●2  $\text{NH}_4^+$ 

IC ICM C01B025-37

CC 49-5 (Industrial Inorganic Chemicals)

Section cross-reference(s): 67

IT Catalysts and Catalysis

(supports, alumina and silica, in  
crystalline ammonium hydrogen phosphate oxalate vanadate  
manufacture)  
IT 129496-78-2P  
RL: PREP (Preparation)  
(manufacture of crystalline, for heterogeneous vanadium phosphate  
catalysts)

L49 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 1979:44496 HCAPLUS Full-text  
DN 90:44496  
OREF 90:7061a,7064a  
TI Catalyst for oxidation of o-xylene to phthalic anhydride  
IN Glukhovskii, N. G.; Kernos, Yu. D.; Moldavskii, B. L.  
PA USSR  
SO U.S.S.R.  
From: Otkrytiya, Izobret., Prom. Obraztsy, Tovarnye Znaki 1978,  
55(39), 28.  
CODEN: URXXAF  
DT Patent  
LA Russian  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	
PI	SU 628943	A1	19781025	SU 1976-2358358	197605 14

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PRAI SU 1976-2358358 A 19760514 <--  
AB The preparation of the catalyst was simplified by mixing an aqueous  
solution of (NH<sub>4</sub>)<sub>7</sub>[P(V<sub>2</sub>O<sub>6</sub>)<sub>6</sub>] with TiO<sub>2</sub> with subsequent application of  
the mixture to an inert carrier at 220-300°.  
IT 68879-77-6  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalyst manufacture from, for oxidation of xylene to phthalic  
anhydride)  
RN 68879-77-6 HCAPLUS  
CN Ammonium vanadium oxide phosphate ((NH<sub>4</sub>)<sub>7</sub>V<sub>12</sub>O<sub>32</sub>(PO<sub>4</sub>)) (CA INDEX  
NAME)

Component	Ratio	Component Registry Number
=====+	=====+	=====
O	32	17778-80-2
H4N	7	14798-03-9
O4P	1	14265-44-2

V		12		7440-62-2
IC	B01J037-04			
CC	67-1 (Catalysis and Reaction Kinetics)			
	Section cross-reference(s): 25			
IT	Oxidation catalysts			
	(vanadyl phosphate-titania-support, for			
	xylene to phthalic anhydride)			
IT	68879-77-6			
	RL: RCT (Reactant); RACT (Reactant or reagent)			
	(catalyst manufacture from, for oxidation of xylene to phthalic			
	anhydride)			

=>